EIGHTH EDITION

CATALOGUE OF

EUGENE DIETZGEN CO.

DRAWING MATERIALS AND SURVEYING INSTRUMENTS

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CATALOGUE & PRICE LIST of

EUGENE DIETZGEN CO.

MANUFACTURERS & IMPORTERS of

DRAWING MATERIALS & SURVEYING INSTRUMENTS

CHICAGO . . . . 181 Monroe Street
NEW YORK . . . 214-220 E. 23d St.
SAN FRANCISCO . 16-18 First Street
NEW ORLEANS . 615 Common St.

Eighth Edition *Price 50 Cents*

ENTERED ACCORDING TO ACT OF CONGRESS IN THE YEAR NINETEEN HUNDRED AND SEVEN

BY

EUGENE DIETZGEN CO.

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OFFICES AND SALESROOMS OF EUGENE DIETZGEN CO.

NEW ORLEANS ~ 615 COMMON ST.

SAN FRANCISCO ~ 16-18 FIRST ST.

EUGENE DIETZGEN CO. FACTORY AT CHICAGO

INTRODUCTORY

IN PRESENTING this, the Eighth Edition of our catalogue, we wish to thank our friends for the patronage which has made possible the issuing of this catalogue and the enlargement of our factories, stores and offices.

To meet the constantly growing demand for our products, our manufacturing facilities have been more than doubled by the erection of a new model manufacturing plant at Chicago. This we have equipped with the most modern appliances, in order to secure the highest degree of perfection in the goods produced by us.

Since the last edition of our catalogue was issued, there has been an increase (in both labor and material) of the cost of most of the goods we sell. We have, however, not advanced our prices, excepting in such cases as were absolutely necessary, and we can assure our patrons that our prices will continue to be the lowest consistent with first-class material and workmanship. It has been our constant aim to improve the standard of the goods manufactured or controlled by us, and this policy we shall continue to follow.

This catalogue shows the complete line of Instruments and material we regularly manufacture and keep in stock, but any special goods, Instruments of Precision, etc., will be made to order at the lowest prices consistent with careful and accurate workmanship.

To those who are as yet unacquainted with us or our line, we wish to say that all our goods are guaranteed to be exactly as described, and we respectfully solicit a trial order—this being the best means of proving that our goods are high grade and our prices reasonable.

Our goods may be procured from our large warerooms in CHICAGO, NEW YORK, SAN FRANCISCO or NEW ORLEANS, or from the leading dealers in other cities of the United States, Canada and Mexico.

In conclusion we wish to again thank our numerous patrons for their kind support in the past, and we hope, by our careful attention to their wants, to merit a continuance of same.

EUGENE DIETZGEN CO.

Chicago, June 1, 1907.

NOTICE

ORDERING

In making an order give the Catalogue number, and in some instances—like papers—size, thickness, color, etc., or when ordering tapes, length in feet, etc. An omission of any of these important particulars often causes a delay of several days, in order that we may write and find out just what is wanted. If you have had the goods before and wish to order them again, repeat in your order the description of them as given in our bill, *or give date of bill.*

SHIPPING DIRECTIONS

State whether you wish your goods sent by express or freight, and if there is more than one route, designate which you prefer. Small packages or parcels weighing less than 50 to 60 pounds will be forwarded more safely, more expeditiously, and in most instances equally as cheap by express instead of freight.

Freight shipments usually require packing boxes, *which will be charged at cost.*

Small articles weighing one pound and less can be sent by express, prepaid; or by mail at one cent per ounce, and such charges will be added to the price of the goods. Registering mail matter lessens the risk of loss.

We cannot be responsible for goods lost or damaged in transmission by mail.

In all cases where no shipping directions are given, we send goods according to our best judgment.

REMITTANCES

Remittances may be made either by bank draft payable to our order, or by post-office money order, or by cash sent by any of the express companies. If cash is forwarded by mail, the letter should be registered. A remittance of *Five Dollars* must accompany the order, if goods are ordered by express, C. O. D., and express charges for collection will be added to the amount of the bill. Collection charges will be saved and goods delivered quicker *by remitting in full with order.*

ACCOUNTS

If you have never had an account with us and wish to order goods, send a remittance with order, or first class references, to insure prompt attention. Failure to remit or send references compels us to make inquiry as to the responsibility of the party ordering, and delays the shipment of goods until we receive satisfactory information.

GUARANTEE

We guarantee our goods to be exactly as represented, and any article which does not prove entirely satisfactory may be returned to us and will be promptly replaced or money refunded.

Our policy has always been to please our patrons in every respect, believing that a thoroughly satisfied customer is the best advertisement.

Should any cause for complaint arise, prompt notice of same would be greatly appreciated.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

DRAWING PAPERS IN SHEETS

WHATMAN'S HAND MADE

The **Whatman's** Papers are made with three different styles of surface, as follows:

H. P. signifies **"Hot Pressed,"** has a smooth surface, mostly used for pencil and ink and very fine line drawing.

C. P. signifies **"Cold Pressed,"** has a finely grained surface; used for general drawing and water-color painting.

R. signifies **"Rough,"** has a coarsely grained surface, used for very bold drawing and sketching (Torchon Paper).

In ordering please state size and surface wanted—H. P., C. P. or R.

No. 1. **"WHATMAN'S"** Drawing Paper. **Retree,** with **H. P.** or **C. P.** surface.

Cap	13 × 17 inches,	Per quire,	$0 60
Demy	15 × 20 "	"	90
Medium	17 × 22 "	"	1 25
Royal	19 × 24 "	"	1 55
Super Royal	19 × 27 "	"	1 85
Imperial	22 × 30 "	"	2 60
Double Elephant	27 × 40 "	"	4 80
Antiquarian	31 × 53 "	"	14 75
"	31 × 53 "	Per sheet,	80

No. 1B. **"WHATMAN'S"** Drawing Paper. **Selected Best,** with **H. P.** or **C. P.** surface.

Cap	13 × 17 inches,	Per quire,	$0 80
Demy	15 × 20 "	"	95
Medium	17 × 22 "	"	1 40
Royal	19 × 24 "	"	1 80
Super Royal	19 × 27 "	"	2 10
Imperial	22 × 30 "	"	3 00
Double Elephant	27 × 40 "	"	5 75
Antiquarian	31 × 53 "	"	27 00
"	31 × 53 "	Per sheet,	1 50

No. 2. **"WHATMAN'S"** Drawing Paper. With **R.** surface (Torchon Paper).

Royal	19 × 24 inches,	Per quire,	$1 55
Imperial	22 × 30 "	"	2 70
Double Elephant	27 × 40 "	"	4 80

No. 3. **"WHATMAN'S"** Drawing Paper. Extra heavy, with **H. P., C. P.** or **R.** surface.

		Per quire.	Per sheet.
Imperial	22 × 30 inches,	$ 6 70	$0 35
Double Elephant	27 × 40 "	10 00	60

For mounted Whatman's Papers see page 10.

Samples of Sheet Papers mailed on application, or general Sample Book for 15 cents.

DRAWING PAPERS IN SHEETS *Continued*

No. 4. **"HYPERION"** Drawing Paper. For description, see No. 83.

Royal	19 × 24 inches,	Per quire,	$2 00
Imperial	22 × 30 "	"	3 25
Double Elephant	27 × 40 "	"	6 00

No. 5. **"NAPOLEON COLD PRESSED"** Drawing Paper. Of excellent quality, with smooth surface, very tough. For water-color and pen and ink work. It stands erasing perfectly.

Royal	19 × 24 inches,	Per quire,	$1 65
Imperial	22 × 30 "	"	2 35
Double Elephant	27 × 40 "	"	3 60

No. 6. **"SUPER SUPER EGGSHELL"** Drawing Paper. For description, see No. 75.

Royal	19 × 24 inches, rough surface,	Per quire,	$1 80
Imperial	22 × 30 " " "	"	2 75
Double Elephant	27 × 40 " " "	"	5 25

No. 7. **"LINCOLN"** Drawing Paper. Slightly grained surface. Principally used for architectural drawings.

Royal	19 × 24 inches,	Per quire,	$1 20
Imperial	22 × 30 "	"	1 80
Double Elephant	27 × 40 "	"	3 00

No. 8. **"LESSING"** Drawing Paper. Smooth surface for line work in ink or pencil, very tough. Much used for Mechanical and Civil Engineers' drawings and Surveyors' maps.

Double Elephant	27 × 40 inches,	Per quire,	$4 50

No. 9. **"STANDARD"** Drawing Paper. A white paper with medium surface, excellent erasing properties. Takes ink and color and is especially adapted for college and school work.

Cap	14 × 17 inches,	Per quire,	$0 33
Demy	15 × 20 "	"	50
Medium	17 × 22 "	"	66
Royal	19 × 24 "	"	84
Super Royal	19 × 27 "	"	1 00
Imperial	22 × 30 "	"	1 30
Double Elephant	27 × 40 "	"	2 50

No. 10. **"UNION"** Drawing Paper. Very suitable for school use. Slightly grained surface.

Cap	14 × 17 inches,	Per quire,	$0 18
Demy	15 × 20 "	"	24
Medium	17 × 22 "	"	36
Royal	19 × 24 "	"	45
Super Royal	19 × 27 "	"	54
Imperial	22 × 30 "	"	75
Double Elephant	27 × 40 "	"	1 50

Samples of Sheet Papers mailed on application, or general Sample Book for 15 cents.

DRAWING PAPERS IN SHEETS *Continued*

No. 11. **"SAXON"** Drawing Paper. For description, see No. 59.

Royal . . .	19 × 24 inches, ...	Per quire,	$0 90
Imperial . .	22 × 30 "	"	1 30
Special . .	24 × 36 "	"	1 90
Double Elephant	27 × 40 "	"	2 00

No. 12. **"CREAM"** Drawing Paper. For description, see No. 60.

Royal . . .	19 × 24 inches, ...	Per quire,	$1 10
Imperial . .	22 × 30 "	"	1 60
Special . .	24 × 36 "	"	2 40
Double Elephant	27 × 40 "	"	2 60

No. 13. **"STRATHMORE"** Drawing Paper. Medium surface. For pen and ink sketching and water-color work. Of excellent erasing properties.

14½ × 23	inches, . .	Per 100 sheets,	$3 00,	Per quire,	$ 90
23 × 29	" . .	"	6 00;	"	1 80

No. 14. **"STRATHMORE" 2-Sheet** Drawing Board. Medium surface. For pencil, pen and water-color drawing.

14½ × 23	inches, . .	Per 100 sheets,	$ 6 00.	Per quire,	$1 80
23 × 29	" . .	"	12 00:	"	3 60

No. 15. **"STRATHMORE" 2-Sheet** Drawing Board. Smooth surface. For pen and ink drawing.

14½ × 23	inches, . .	Per 100 sheets,	$ 6 00;	Per quire,	$1 80
23 × 29	" . .	"	12 00;	"	3 60

No. 16. **"STRATHMORE" 3-Sheet** Drawing Board. Medium surface. For pencil, pen and water-color drawing.

14½ × 23	inches, . .	Per 100 sheets,	$ 9 00;	Per quire,	$2 70
23 × 29	" . .	"	18 00;	"	5 40

No. 16B. **"STRATHMORE" 3-Sheet** Drawing Board. Smooth surface. For pen and ink drawing.

14½ × 23	inches, . .	Per 100 sheets,	$ 9 00;	Per quire,	$2 70
23 × 29	" . .	"	18 00;	"	5 40

For Nos. 17 and 18 Blue Print Papers, see page 16.

No. 19. **CHARCOAL PAPER.** White.

Royal 19 × 25 inches, ... Per quire, $0 60

No. 19B. **MICHALLET CHARCOAL PAPER.** White.

Royal 19 × 25 inches, ... Per quire, $0 90

Samples of Sheet Papers mailed on application, or general Sample Book for 15 cents.

E. D. CO.'S BRISTOL BOARDS

No. 21.

Each Sheet Stamped

This Bristol Board possesses the thickness, quality, tint and size required by the United States patent office.

It can be rolled without injury and has a hard, white surface, that stands erasing perfectly.

No. 20. **PATENT OFFICE** Bristol Board. 3-ply. Plain.

	Per gross.	Per doz.
10 × 15 inches, U. S. standard,	$ 6 00	$0 60
15 × 20 " English standard,	12 00	1 20

No. 21. **PATENT OFFICE** Bristol Board. 3-ply. Printed with border, etc.

	Per gross.	Per doz.
10 × 15 inches, U. S. standard,	$6 90	$0 72

No. 24. **"IVORY WHITE"** Bristol Board. 3-ply. For pen and ink drawings.

20 × 30 inches,	Per doz., $1 80
30 × 40 "	" 3 60

No. 26. **REYNOLDS'** White Bristol Board. Smooth surface.

			2 sheets.	3 sheets.	4 sheets.
Cap	12½ × 15¼ inches,	Per doz.,	$0 60	$0 90	$1 20
Demy	14⅝ × 18¼ "	"	90	1 35	1 75
Medium	16½ × 20¾ "	"	1 20	1 80	2 40
Royal	18¼ × 22⅜ "	"	1 50	2 40	3 10
Imperial	21½ × 28¾ "	"	....	4 70	6 00

No. 28. **"STRATHMORE"** Illustrating Board. Medium. Water-color paper mounted on heavy board.

22× 28 inches,	Per sheet, $0 30
30× 40 "	" 50

No. 29. **"STRATHMORE"** Illustrating Board. Light weight (one side only)

22 × 30 inches	Per sheet, $0 20

No. 30. **WHITE** Mounting Board.

	22 × 28 4 ply.	22 × 28 6 ply.	22 × 28 8 ply.	28 × 44 10 ply.	30 × 40 in 16 ply.
Per doz.,	$0 75	$1 00	$1 20	$3 00	$5 25
Per sheet,	08	10	12	30	50

Nos. 28 to 30 must be packed flat for shipment, to prevent injury by rolling them. Packing charges are about 5 cents per square foot.

DETAIL PAPERS IN ROLLS

No. 50. **"ORION"** Manilla Paper. Smooth. Is mostly used by Pattern Makers; it will not stand much erasing. Three weights: Medium (X), thick (XX), and extra thick (XXX).
In rolls of about 75-100 lbs., 36, 40, 44, 48 in. wide. Per pound, $0 10

"LIGHT COLOR ORION" Detail Paper. Of selected manilla stock. expressly made for drafting purposes.

Nos. 52A, 52B, 52C are made with slightly ribbed (R) surface.

Nos. 53A, 53B, 53C are made with slightly grained (G) surface.

They stand a reasonable amount of erasing and will take India ink and pencil well.

No. 52A. With "R" surface. / No. 53A. With "G" surface.	**Medium.**	In rolls of about 100-120 lbs., 36, 42, 48 in. wide, Per pound,				$0 11
36 inches wide,		Per 100 yds.,	$3 60;	50 yds.,		2 00
42 " "		"	4 00;	"		2 25
48 " "		"	4 50;	"		2 50
No. 52B. With "R" surface. / No. 53B. With "G" surface.	**Thick.**	In rolls of about 100-120 lbs., 36, 42, 48 in. wide, . Per pound,				$0 11
36 inches wide,		Per 100 yds.,	$4 20;	50 yds.,		2 30
42 " "		"	4 80;	"		2 70
48 " "		"	5 50;	"		3 10
No. 52C. With "R" surface. / No. 53C. With "G" surface.	**Extra Thick.**	In rolls of about 100-120 lbs., 36, 42, 48 in. wide, Per pound,				$0 11
36 inches wide,		Per 100 yds.,	$4 80;	50 yds.,		2 70
42 " "		"	5 50;	"		3 10
48 " "		"	6 25;	"		3 50

No. 54A. **"BUFF COLOR ORION"** Detail Paper. **Medium.** Slightly grained surface. The best manilla drafting paper; stands erasing to a very fair extent, and takes pencil and ink well. Its tint permits of much handling without soiling.

In rolls of about 100-120 lbs., 36, 42, 48 in. wide, . Per pound,					$0 12
36 inches wide,	Per 100 yds.,	$4 50;	50 yds.,		2 50
42 " "	"	5 40;	"		3 10
48 " "	"	6 00;	"		3 40

No. 54B. **"BUFF COLOR ORION"** Detail Paper. **Thick.**

In rolls of about 100-120 lbs., 36, 42, 48, 54 in. wide, Per pound,				$0 12
36 inches wide,	Per 100 yds.,	$5 10;	50 yds.,	2 90
42 " "	"	6 00;	"	3 40
48 " "	"	7 20;	"	4 00
54 " "	"	8 10;	"	4 50

No. 54C. **"BUFF COLOR ORION"** Detail Paper. **Extra Thick.**

In rolls of about 100-120 lbs., 36, 42, 48 in. wide, . Per pound,				$0 12
36 inches wide,	Per 100 yds.,	$5 70;	50 yds.,	3 20
42 " "	"	6 90;	"	3 80
48 " "	"	8 10;	"	4 50

Samples of Roll Papers mailed on application, or general Sample Book for 15 cents.

DRAWING PAPERS IN ROLLS

(Reduced facsimiles of our labels.)

After careful study of draftsmen's requirements we have settled upon the following papers as possessing, in the greatest degree, the various qualities which go towards making **good** drawing paper.

Each paper has certain features especially valuable for the purpose to which it is to be applied, and as we exercise the greatest care in keeping our goods uniform, our patrons may always rely upon getting the quality of paper they may require.

The papers listed in this catalogue are manufactured exclusively for us, and can be obtained direct from us or from dealers handling our goods.

The constantly increasing demand for our various brands has been very gratifying, and assures us that our efforts to keep these papers as nearly perfect as possible have been appreciated by our patrons.

Each paper listed is followed by a brief description, thus enabling persons not familiar with our goods to choose the paper best adapted to their purpose.

Sample Books of either our Sheet, Roll, Mounted or Tracing Papers sent on application.

No. 56. **"TEUTON"** Drawing Paper. **Medium.** A white sketching paper, extremely tough. Will not break in folding. With best erasing quality, and suitable for pencil, ink and color work. Very moderate in price.

In rolls of about 100 lbs., 36 or 42 inches wide, . Per pound, $0 24

	Per 100 yds.	50 yds.	25 yds.	10 yds.
36 inches wide, . .	$5 75	$3 25	$1 80	$0 80
42 " " . .	6 70	3 75	2 20	1 00

No. 58. **"TEUTON"** Drawing Paper. **Thick.** Similar to No. 56, but of considerably heavier stock.

In rolls of about 100 lbs., 36 or 42 inches wide, . Per pound, $0 24

	Per 100 yds.	50 yds.	25 yds.	10 yds.
36 inches wide, . .	$ 8 70	$4 90	$2 80	$1 30
42 " " . .	10 20	5 60	3 25	1 50

Samples of Roll Papers mailed on application, or general Sample Book for 15 cents.

DRAWING PAPERS IN ROLLS *Continued*

No. 59. **"SAXON"** Drawing Paper. Of light cream color and very moderate price. It has a smooth and hard drawing surface, is extremely tough, and matchless as a detail drawing paper for both pencil and ink, which is expected to stand rough handling.

In rolls of about 40-45 lbs., 30, 36, 42 inches wide, Per pound, $0 25

	Per 100 yds.	50 yds.	25 yds.
30 inches wide,	$ 7 50	$4 00	$2 15
36 " "	9 00	4 80	2 60
42 " "	11 30	6 00	3 20

No. 60. **"CREAM"** Drawing Paper. Is the finest paper in the market for preliminary and general drawings and sketching, and the ***cheapest*** that meets all requirements of a good drawing paper. It will stand erasing perfectly, and take ink, pencil and water-color well. Unlike other papers of similar kind, it will not break in folding. Its cream tint is agreeable to the eye, and will admit of much handling without soiling.

In rolls of about 35-40 lbs., 30, 36, 42, 63 in. wide, . Per pound, $0 29

	Per 100 yds.	50 yds.	25 yds.	10 yds.	Yard.
27 inches wide,	$ 9 00	$ 4 60	$2 40	$1 00	$0 12
30 " "	9 70	5 10	2 70	1 15	13
36 " "	11 00	5 75	3 10	1 35	15
42 " "	14 25	7 50	4 00	1 70	20
63 " "	19 50	10 25	5 35	2 50	30

No. 62. **"SILVER GRAY"** Drawing Paper. Has a pleasing tint that shows up effectively drawings and sketches. Its first-class erasing quality, combined with its reasonable price, have made it a very popular paper for general drawings. Of the same superior stock as No. 60.

In rolls of about 35-40 lbs., 27, 36, 63 inches wide, . Per pound, $0 33

	Per 100 yds.	50 yds.	25 yds.	10 yds.	Yard.
27 inches wide,	$ 9 60	$ 5 10	$2 70	$1 14	$0 12
36 " "	12 00	6 30	3 30	1 35	15
63 " "	21 00	10 80	5 70	2 40	30

No. 65. **"STANDARD"** Drawing Paper. Is a strong white paper of excellent erasing properties, with slightly grained surface, suitable for work in ink, pencil and color.

In rolls of about 35-40 lbs., 27, 36, 42, 63 in. wide, . Per pound, $0 36

	Per 50 yds.	25 yds.	10 yds.	Yard.
27 inches wide,	$ 6 30	$3 30	$1 35	$0 15
36 " "	7 20	3 90	1 65	20
42 " "	9 00	4 80	2 10	24
63 " "	12 60	6 90	3 00	35

Samples of Roll Papers mailed on application, or general Sample Book for 15 cents.

DRAWING PAPERS IN ROLLS *Continued*

No. 70. **"DOUBLE FORCE"** Drawing Paper. Is the toughest paper made. Its surface is cold pressed, but somewhat smooth. Can be folded without breaking, and is very suitable for map work or drawings subjected to rough handling in the machine shop or outdoors.

In rolls of about 45 lbs., 27, 36, 42, 63 in. wide. . Per pound, $0 45

	Per 25 yds.	10 yds.	Yard.
27 inches wide,	$4 00	$1 68	$0 19
36 " "	5 00	2 10	25
42 " "	6 50	2 65	30
63 " "	9 50	3 90	45

No. 75. **"SUPER SUPER EGGSHELL"** Drawing Paper. Is made of the **best** linen stock. Owing to its peculiarly pebbled surface, drawings made on it show up most effectively. Unsurpassed for perspective drawing and water-color work.

In rolls of about 45 lbs., 36, 42 inches wide, . Per pound, $0 50
" " " " 60 " 58 " . " . . " " 50

	Per 25 yds.	10 yds.	Yard.
36 inches wide,	$ 7 20	$3 00	$0 33
42 " "	8 40	3 50	36
58 " "	10 80	4 50	47

No. 76. **"SUPER SUPER EGGSHELL"** Drawing Paper. **Extra Heavy.**

In rolls of 60 t 70 lbs., 58 inches wide, ... Per pound, $0 50

	Per 25 yds.	10 yds.	Yard.
58 inches wide,	$13 50	$5 70	$0 65

No. 80. **"SUPER SUPER COLD PRESSED"** Drawing Paper. Is made of the same stock as Nos. 75-76, and differs from them only in the surface, which is cold pressed, or medium smooth.

In rolls of about 45 lbs., 36, 42 inches wide, . Per pound, $0 50
" " " " 60 " 58 " " . . " " 50

	Per 25 yds.	10 yds.	Yard.
36 inches wide,	$ 7 20	$3 00	$0 33
42 " "	8 40	3 50	36
58 " "	10 80	4 50	47

No. 81. **"SUPER SUPER COLD PRESSED"** Drawing Paper. **Extra Heavy.**

In rolls of about 60 to 70 lbs, 58 inches wide, . . Per pound, $0 50

	Per 25 yds.	10 yds.	Yard.
58 inches wide,	$13 50	$5 70	$0 65

No. 83. **"HYPERION"** Drawing Paper. A pure white drawing paper which is the nearest approach to hand-made paper ever attained in a roll paper. It is made of the very best stock obtainable, has a cold pressed but somewhat smooth surface and can be used for the same purposes and to the same advantage as the hand-made paper. Of excellent erasing quality, equally well adapted for pencil, ink and color work. The same paper in sheets listed under No. 4.

In rolls of about 40 lbs., 58 inches wide, . . . Per pound, $0 65

	Per 25 yds.	10 yds.	Yard.
58 inches wide,	$14 20	$6 00	$0 70

Samples of Roll Papers mailed on application, or general Sample Book for 15 cents.

MOUNTED DRAWING PAPERS

IN ROLLS OF 10 YARDS. MOUNTED ON MUSLIN.

(Reduced facsimiles of our labels.)

For maps and other valuable drawings made to last, that should not tear or break by much handling or folding, the following papers mounted on muslin will be best adapted.

Our papers in rolls as well as sheets are carefully and smoothly mounted on muslin of the best quality, and are air-dried.

No. 99. **"CREAM"** Drawing Paper. Mounted. The same paper as described under No. 60.

	Per 10 yds.	Yard.
36 inches wide,	$ 5 80	$0 70
42 " "	7 50	90
63 " "	12 00	1 40

No. 100. **"SILVER GRAY"** Drawing Paper. Mounted. The same paper as described under No. 62.

	Per 10 yds.	Yard.
36 inches wide,	$ 6 20	$0 75
63 " "	13 00	1 50

No. 101. **"STANDARD"** Drawing Paper. Mounted. The same paper as described under No. 65.

	Per 10 yds.	Yard.
36 inches wide,	$ 6 20	$0 75
42 " "	7 75	90
63 " "	13 00	1 50

No. 105. **"DOUBLE FORCE"** Drawing Paper. Mounted. The same paper as described under No. 70.

	Per 10 yds.	Yard.
36 inches wide,	$ 6 60	$0 80
42 " "	8 40	1 00
63 " "	13 50	1 60

No. 110. **"SUPER SUPER EGGSHELL"** Drawing Paper. Mounted. The same paper as described under No. 75.

	Per 10 yds.	Yard.
36 inches wide,	$ 7 50	$0 90
42 " "	9 25	1 10
58 " "	12 50	1 45

Samples of Mounted Papers mailed on application, or general Sample Book for 15 cents.

MOUNTED DRAWING PAPERS IN ROLLS *Continued*

No. 111. **"SUPER SUPER EGGSHELL"** Drawing Paper. Mounted. Extra heavy. The same paper as described under No. 76.

	Per 10 yds.	Yard.
58 inches wide,	$13 70	$1 60

No. 115. **"SUPER SUPER COLD PRESSED"** Drawing Paper. Mounted. The same paper as described under No. 80.

	Per 10 yds.	Yard.
36 inches wide,	$7 50	$0 90
42 " "	9 25	1 10
58 " "	12 50	1 45

No. 116. **"SUPER SUPER COLD PRESSED"** Drawing Paper. Mounted. Extra heavy. The same paper as described under No. 81.

	Per 10 yds.	Yard.
58 inches wide,	$13 70	$1 60

No. 120. **INDESTRUCTIBLE PAPER CLOTH.** Smooth. An article made of muslin, to which the paper pulp is applied. It is pliable and very strong, takes pencil and ink well and stands erasing to a serviceable extent. In rolls of 30-40 yards.
38 inches wide, ... Per yard, $0 42

MOUNTED DRAWING PAPERS

IN SHEETS. MOUNTED ON MUSLIN.

Either furnished with the muslin standing over on one or all edges, or with edges trimmed to the exact size of the sheet. Unless otherwise specified the sheets will be furnished with muslin trimmed on all edges.

Large sheets, for city, county or State maps, mounted to order at short notice.

No. 125. **"WHATMAN'S"** Drawing Paper. Mounted. (Specify whether hot or cold pressed surface.)

Royal	19 × 24 inches, Selected Best,	Per sheet,	$0 30
Imperial . . .	22 × 30 " " "	"	48
Double Elephant	27 × 40 " " "	"	90
Antiquarian . .	31 × 53 " " "	"	2 10

No. 126. **"WHATMAN'S"** Drawing Paper. Double Mounted. (Specify whether hot or cold pressed surface.) For Map or Atlas work. Double mounted—muslin in the middle, with paper on both sides.

Imperial . .	22 × 30 inches, Selected Best.	Per sheet,	$0 86
Double Elephant	27 × 40 " "	"	1 50

No. 127. **"SUPER SUPER EGGSHELL"** Drawing Paper, No. 75, Mounted. Or if desired S. S. Cold Pressed, No. 80, mounted, please specify.

19 × 24 inches,	Per sheet,	$0 30
22 × 30 "	"	45
27 × 40 "	"	75
31 × 53 "	"	1 20

No. 128. **"SUPER SUPER EGGSHELL"** Drawing Paper, No. 75, Double Mounted. For Atlas work. Or if desired S. S. Cold Pressed, No. 80, double mounted, please specify. One sheet double mounted consists of two sheets of paper with muslin in the middle.

22 × 30 inches,	Per sheet,	$0 90
27 × 40 "	"	1 45

Other sizes of mounted sheets furnished to order.

Samples of Mounted Papers mailed on application, or general Sample Book for 15 cents.

TRACING CLOTHS

No. 135.

"LION" TRACING CLOTH.

No. 133. In rolls of 24 yards, one side glazed, the other dull.

30 inches wide,	Per roll,	$ 6 40;	Per yard,	$0 35
36 " "	"	7 40;	"	40
42 " "	"	10 00;	"	50

"IMPERIAL" TRACING CLOTH.

No. 135. In rolls of 24 yards, one side glazed, the other dull.

30 inches wide,	Per roll	$8 10	~~$ 7 75~~;	Per yard,	$0 40
36 " "	"	9 00	~~8 60~~;	"	45
38 " "	"	11 10	~~10 75~~;	"	55
42 " "	"	12 10	~~11 75~~;	"	60
48 " "	"	16 00	~~15 50~~;	"	80
54 " "	"	17 00	~~16 50~~;	"	85

"RELIANCE" TRACING CLOTH.

No. 136. In rolls of 24 yards, one side glazed, the other dull.

30 inches wide,	Per roll,	$ 6 40;	Per yard,	$0 35
36 " "	"	7 40;	"	40
43 " "	"	10 00;	"	50

The Reliance Cloth is heavier and less transparent than Nos. 133 and 135.

LIQUID TRACING CLOTH CLEANER.

No. 140. In 2 oz. bottles, ... Each, $0 35

This liquid removes pencil marks, dirt and grease spots, but not any waterproof ink, by moistening the piece of flannel, furnished with each bottle, and rubbing with it gently over the cloth. Tracing cloth will take ink readily after its application.

TRACING CLOTH POWDER.

No. 142. In tin shakers, ... Each, $0 15

Rubbed evenly with a piece of flannel over the cloth and then removed, in order to make the cloth take ink readily.

INKOFF.

No. 144. In 2 oz. bottles, with sponge, cloths and directions for use, Each, $1 00

For erasing Black Waterproof Drawing Ink lines and figures without injury to the tracing cloth.

TRACING PAPERS IN ROLLS

(Reduced facsimiles of our labels.)

No. 170. **"ORION"** Detail Tracing Paper. Of manilla stock for detail work.
40 inches wide, ... Per roll of 100 yds., $2 40
48 " " . . . . . " " " 100 " 3 00

No. 171. **"ULTRA"** Detail Tracing Paper. White in color and superior to Manilla Tracing Papers. Recommends itself on account of its low price for common full-size tracings.
40 inches wide, ... Per roll of 50 yds., $1 50
48 " " . . . . . " " 50 " 1 80

No. 172. **"ZETA"** Tracing Paper. Thin. Glazed. Very transparent. Ordinarily called "Glass Paper," used mostly for lithographic work.
39 inches wide, ... Per roll of 20 yds., $1 35

No. 174. **"TRIUMPH"** Tracing Paper. Medium thick. Transparent. Takes pencil and ink well.
39 inches wide, ... Per roll of 20 yds., $1 20

No. 175. **"ADVANCE"** Tracing Paper. Thin. Very transparent.
42 inches wide, ... Per roll of 20 yds., $1 20

No. 177. **"BOND"** Tracing Paper. Thin. Dull finish. Very tough and transparent.
42 inches wide, ... Per roll of 20 yds., $1 35

No. 177½. **"CENTURY BOND"** Sketching Paper. Medium thick. Of unsurpassed strength and moderate transparency. Especially adapted for machine drawings and other work requiring considerable handling.
36 inches wide, . . Per roll of 25 yds., $1 85; 50 yds., $3 50
42 " " . " " 25 " $2 20; 50 " 4 00

No. 178. **"NATURAL"** Tracing Paper. Unglazed. The best for detail or full size tracings.
57 inches wide, ... Per roll of 44 yds., $3 90

No. 179. **"NATURAL"** Tracing Paper. Glazed.
57 inches wide, ... Per roll of 44 yds., $3 90

Samples of Tracing Cloth and Papers mailed on application, or general Sample Book for 15 cents.

TRACING PAPERS IN ROLLS *Continued*

No. 180. **"NATURAL"** Tracing and Sketching Paper. A white paper, strong and tough, especially made for sketching and transferring. Stands erasing, and takes pencil, ink and color well.
36 inches wide, ... Per roll of 50 yds., $2 40
62 " " . . . . . " " 50 " 3 60

No. 181. **"VIENNA"** Tracing Paper. Medium thick.
43 inches wide, ... Per roll of 20 yds., $2 00

No. 182. **"VIENNA"** Tracing Paper. Thick.
43 inches wide, ... Per roll of 20 yds., $2 40

No. 183. **"PARCHMENT"** Tracing Paper. Medium thick.
39 inches wide, ... Per roll of 20 yds., $3 50

No. 184. **"PARCHMENT"** Tracing Paper. Thick.
39 inches wide, ... Per roll of 20 yds., $4 20

No. 185. **"VELLUM"** Tracing Paper. Medium thick. Very fine for ink work.
39 inches wide, ... Per roll of 20 yds., $3 20

No. 186. **"PREMIER"** Tracing Paper. Medium thick.
42 inches wide, ... Per roll of 20 yds., $2 00

No. 188. **"STERLING"** Tracing Vellum. Of exceptional strength and transparency. Very fine for ink and color work. Stands erasing perfectly and does not "buckle" nor deteriorate. Incased in strong tubes.
36 inches wide, ... Per roll of 20 yds., $4 00
42 " " . . . . . " " 20 " 5 00

No. 189. **"DEECO"** Tracing Paper. Thin. Very transparent. Especially adapted for use in tracing from blue prints.
42 inches wide, ... Per roll of 20 yds., $1 75

TRACING PAPERS IN SHEETS

No. 190. **"VEGETABLE"** Tracing Paper. Very tough and transparent.

Cap	13 × 17 inches, ...	Per quire,	$0 90
Demy	16 × 20 "	"	1 25
Royal	19 × 25 "	"	2 00
Imperial	22 × 28	"	2 50

No. 198. **"CRANE'S"** Bond Paper.

		Thin No. 16	Medium No. 18	Thick No. 21
19 × 24 inches, . . .	Per quire,	$0 90	$1 10	$1 30
19 × 30 "	"	1 20	1 40	1 60

Samples of Tracing Cloth and Papers mailed on application, or general Sample Book for 15 cents.

IMPROVED SENSITIZED

BLUE PRINT PAPERS

Our assortment of sensitized Blue Print Papers as listed on the following pages will be found of a variety sufficient to fulfill any requirement.

We pay particular attention to this department of our business, and as we have adopted every improvement in coating methods which our many years of experience has suggested, we feel justified in saying that we now have the most up-to-date and complete plants for scientifically preparing Blue Print and Vandyke Papers, in the world.

We use the purest chemicals and employ only such papers which extensive tests have proved best adapted for the purpose. Expense has been entirely disregarded when some device which would improve our product could be adopted. By adhering to this policy, and by making use of improved processes and machinery whenever possible, we have gradually evolved our present splendid equipment. The extraordinary success attained by our product proves conclusively that our efforts in this direction are fully appreciated by our patrons.

"RADIANT" Papers are manufactured for us by the **Johannot Mills**, in France, who have a world-wide reputation for making papers of unsurpassable excellence. They are of the highest grade of chemically pure stock, of unequaled tensile strength, always uniform in weight and have a superior finish. These features, combined with our famous sensitizing solutions, produces Blue Print Paper possessing printing and keeping qualities which defy comparison. All these papers bear the water-mark of the mill.

"HYPERION" Papers are of a high grade of chemically pure stock, will always be found uniform in strength and finish and of first-class printing and keeping qualities.

"UNION" Papers are of the second grade of stock and are manufactured by us to fill a demand for a low-priced, reliable Paper for shop use and general distribution. They will be found to equal, if not surpass, many other so-called "high grade" papers.

We manufacture our Blue Print Papers and Cloths regularly in **three solutions,** as described below, but can also furnish our papers coated with any special solution desired, to meet local conditions as to sun or artificial light.

REGULAR PRINTING.—Requiring an exposure of about four minutes in bright sunlight. Best adapted for use during the summer months and for making Blue Line Positive Prints from Vandyke Negatives. Of unsurpassed keeping qualities and will produce prints of a deep rich color with sharp lines.

RAPID PRINTING.—Requiring an exposure of about one minute in bright sunlight. **These Papers were first introduced by us,** are invaluable in cloudy weather and are now generally used in place of the Regular solution by those who require prompt results; of first-class printing and keeping qualities.

ELECTRIC RAPID PRINTING.—Requiring an exposure of about one-half minute in bright sunlight. On account of the extreme sensitiveness of this solution, it is not recommended for use during the summer months, excepting for printing by **Electric Light,** for which it is especially adapted.

In ordering Blue Print Papers, we request our patrons to please **specify whether "Regular," "Rapid"** or **"Electric Rapid" Printing Paper is desired,** thus avoiding any unnecessary delays in filling orders.

All our Sensitized Blue Print Papers are unrivaled for their **rapidity** of printing, **richness** and **durability** of color, **sharpness** of lines, **strength** in water bath and for their superior **keeping qualities.**

We have extensive departments for sensitizing our various papers at our houses in **NEW YORK, CHICAGO, SAN FRANCISCO** and **NEW ORLEANS.** With these unparalleled facilities our patrons in any part of the country are assured of receiving only freshly prepared paper at all times.

"RADIANT" BLUE PRINT PAPERS

DAILY FRESHLY PREPARED *Highest Grade*

(Reduced facsimiles of our labels.)

In ordering, please specify whether our "REGULAR," "RAPID" or "ELECTRIC RAPID" PRINTING solution is desired.

No. 207. **"RADIANT SATIN." Medium thick.**

	Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,		$1 30	$1 50	$1 70	$2 25
" 50 " "		5 25	6 25	7 25	9 50

No. 209. **"RADIANT SATIN." Thick.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,	. . .	$1 40	$1 60	$1 80
" 50 " "	. . .	6 00	7 00	8 00

No. 211. **"RADIANT PARCHMENT." Extra thin.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,	. . .	$1 00	$1 25	$1 40
" 50 " "	. . .	4 10	5 00	6 00

No. 212. **"RADIANT PARCHMENT." Thin.**

	Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,		$1 25	$1 40	$1 60	$2 20
" 50 " "		5 00	6 00	7 00	9 00

No. 213. **"RADIANT PARCHMENT." Medium thick.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,	. . .	$1 35	$1 55	$1 75
" 50 " "	. . .	5 50	6 50	7 50

No. 214. **"RADIANT PARCHMENT." Thick.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,	. . . .	$1 50	$1 75	$2 00
" 50 " "	. . . .	6 50	7 50	8 50

For description of papers, see preceding page.

Samples of Unprepared Blue Print Papers mailed on application, or general Sample Book for 15 cents.

"HYPERION" BLUE PRINT PAPERS AND CLOTH

DAILY FRESHLY PREPARED *High Grade*

(Reduced facsimiles of our labels.)

In ordering, please specify whether our "REGULAR", "RAPID" or "ELECTRIC RAPID" PRINTING solution is desired.

No. 17. **"HYPERION SATIN." Medium thick.**

	Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,		$0 87	$1 00	$1 15	$1 75
" 50 " "		4 10	4 70	5 30	8 00

No. 18. **"HYPERION SATIN." Thick.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,		$1 00	$1 15	$1 30
" 50 " "		4 75	5 50	6 25

No. 222. **"HYPERION PARCHMENT." Extra thin.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,		$0 78	$0 90	$1 00
" 50 " "		3 30	3 90	4 50

No. 223. **"HYPERION PARCHMENT." Thin.**

	Width,	24 in.	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,		$0 70	$0 84	$0 96	$1 08	$1 65
" 50 " "		3 00	3 60	4 20	4 80	7 10

No. 224. **"HYPERION PARCHMENT." Medium thick.**

	Width,	24 in.	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,		$0 90	$1 10	$1 25	$1 40
" 50 " "		3 90	4 80	5 60	6 40

No. 225. **"HYPERION PARCHMENT." Thick.**

	Width,	30 in.	36 in.	42 in.
Per roll of 10 yds., prepared,		$1 50	$1 70	$1 90
" 50 " "		6 40	7 50	8 50

No. 226. **"HYPERION" BLUE PRINT CLOTH. Medium.**

	Width,	30 in.	36 in.	42 in.	54 in
Per roll of 10 yds., prepared,		$2 90	$3 20	$4 40	$6 00

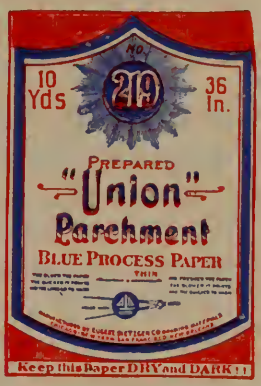
No. 226T. **"HYPERION" BLUE PRINT CLOTH. Extra Thin.**

	Width,	36 in.	42 in.
Per roll of 10 yds., prepared,		$4 00	$5 20

Samples of Unprepared Blue Print Papers mailed on application, or general Sample Book for 15 cents.

"UNION" BLUE PRINT PAPERS

DAILY FRESHLY PREPARED *Medium Grade*



(Reduced facsimiles of our labels.)

Prepared with either our "REGULAR," "RAPID" or "ELECTRIC RAPID" PRINTING solution.

No. 215. **"UNION SATIN." Medium thick.**

	Width, 30 in.	36 in.	42 in.
Per roll of 10 yds., prepared, . .	$0 70	$0 80	$0 90
" 50 " " . .	3 00	3 50	4 00

No. 216. **"UNION SATIN." Thick.**

	Width, 30 in.	36 in.	42 in.
Per roll of 10 yds., prepared, . .	$0 90	$1 00	$1 10
" 50 " " . .	4 00	4 50	5 00

No. 219. **"UNION PARCHMENT." Thin.**

	Width, 30 in.	36 in.	42 in.
Per roll of 10 yds., prepared, . .	$0 60	$0 70	$0 80
" 50 " " . .	2 50	3 00	3 50

No. 220. **"UNION PARCHMENT." Medium thick.**

	Width, 30 in.	36 in.	42 in.
Per roll of 10 yds., prepared, . .	$0 80	$0 90	$1 00
" 50 " " . .	3 50	4 00	4 50

In ordering, please specify whether the "REGULAR," "RAPID" or "ELECTRIC RAPID" PRINTING solution is desired.

For description of papers, see page 14.

For Unprepared Papers, see page 18. For Tubes for preserving paper, See Nos. 243-247. For Blue Print Cloth, see Nos. 226–226T.

Samples of Unprepared Blue Print Papers mailed on application, or general Sample Book for 15 cents.

UNPREPARED BLUE PRINT PAPERS AND CLOTH

No 200R. **"RADIANT SATIN." Medium thick.** (No. 207 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 50 yds., unprepared,	$3 80	$4 50	$5 00	$6 75

No. 201R **"RADIANT SATIN." Thick.** (No. 209 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$4 50	$5 25	$6 00

No. 202R. **"RADIANT PARCHMENT." Extra thin.** (No. 211 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$2 75	$3 25	$3 75

No. 203R. **"RADIANT PARCHMENT." Thin.** (No. 212 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 50 yds , unprepared,	$3 25	$4 00	$4 50	$6 25

No. 204R. **"RADIANT PARCHMENT." Medium thick.** (No. 213 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$3 75	$4 50	$5 25

No. 205R. **"RADIANT PARCHMENT." Thick.** (No. 214 is same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$4 50	$5 00	$5 50

No. 200. **"HYPERION SATIN." Medium thick.** (No. 17 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 50 yds., unprepared,	$2 85	$3 30	$3 85	$5 25

No. 201. **"HYPERION SATIN." Thick.** (No. 18 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$3 30	$4 20	$4 80

No. 203. **"HYPERION PARCHMENT." Thin.** (No. 223 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 50 yds., unprepared,	$2 40	$2 70	$3 30	$4 50

No. 204. **"HYPERION PARCHMENT." Medium thick.** (No. 224 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$3 60	$4 20	$4 80

No. 205. **"HYPERION PARCHMENT." Thick.** (No. 225 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$5 20	$6 10	$7 00

No. 206. **"HYPERION CLOTH."** (No. 226 is the same cloth prepared.)

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., unprepared,	$2 40	$2 70	$3 80	$4 60

No. 208. **"UNION SATIN." Medium thick.** (No. 215 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$2 00	$2 50	$3 00

No. 208½. **"UNION SATIN." Thick.** (No. 216 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$2 75	$3 25	$3 75

No. 210. **"UNION PARCHMENT." Extra thin.** (No. 219 is the same paper prepared.)

Width,	30 in.	36 in.	42 in.
Per roll of 50 yds., unprepared,	$1 75	$2 25	$2 75

VANDYKE SOLAR PAPER

The only satisfactory Solar Process Paper in the market for making Dark Brown or Black Negative Prints and Positive Blue or Black Prints on Paper or Cloth.

For distinctness of outline, clearness of copy, and permanency of results it is unsurpassed, besides possessing all the following essential qualities:

1. Is easily manipulated.
2. Keeps exceedingly well.
3. Does not become brittle.
4. Prints rapidly.
5. Saves original tracing.
6. Cannot spoil positive prints by over-exposure.
7. Patent office drawings easily reproduced.

The **Vandyke Solar Paper** was first introduced and perfected by us, and, although several imitations have appeared upon the market, it still retains its title to being the leading paper of its kind.

DESCRIPTION OF ITS USE AND MANNER OF PRINTING.

From the original tracing a negative copy is made on thin Vandyke paper with white transparent lines on an opaque dark brown background. This negative copy is used in place of the original tracing to produce:

Positive Copies—as many as are required,

either

Black Line Prints with a White Background,

by printing on Vandyke paper with an exposure of about five minutes in good sunlight,

or

Blue Line Prints with a White Background,

by printing on **regular** blue print paper, with about seven minutes' exposure in good sunlight, or on **rapid** blue print paper, with about two minutes' exposure in good sunlight.

Similar results obtained on **Cloth** by using either prepared Blue print cloth or Vandyke cloth as may be desired.

The "Prints" made from this paper are absolutely permanent, and may be **Colored, Altered or Added To,** the same as original drawings.

If properly protected from light and moisture, the prepared paper will retain its strength and printing qualities for many months.

Samples of any of our sensitized papers cheerfully furnished on application.

For prices see next page.

"VANDYKE" SOLAR PAPERS AND CLOTH

FOR NEGATIVE AND POSITIVE PRINTS

(Reduced facsimiles of our labels.)

No. 227. **"VANDYKE"** Solar Paper. **Medium thick.**

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,	$1 75	$2 00	$ 2 25	$ 4 00
" 50 " "	8 50	9 75	11 00	19 50

No. 229. **"VANDYKE"** Solar Paper. **Thin.** For mailing and for negative prints.

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,	$1 75	$2 00	$ 2 25	$ 4 00
" 50 " "	8 50	9 75	11 00	19 50

The thin and most transparent No. 229 Vandyke Solar Paper is, of course, the most suitable to make negative copies on.

No. 231. **"VANDYKE" CLOTH. Medium.**

Width,	30 in.	36 in.	42 in.	54 in.
Per roll of 10 yds., prepared,	$4 00	$4 50	$5 75	$9 50

No. 232. **"VANDYKE" CLOTH. Extra thin.**

Width,	36 in.	42 in.
Per roll of 10 yds., prepared, ...	$5 50	$6 60

Prints made on our Extra Thin Vandyke Cloth No. 232 are invaluable as shop records where the articles manufactured are standardized, since erasures and additions can readily be made on same. On account of the transparency of the cloth the prints can be used as tracings showing the progress of manufacture, in this manner doing away with the necessity of tedious duplicating and tracing by hand.

Fixing Salt and full directions accompany every roll.

VANDYKE FIXING SALT.

For intensifying and fixing prints.

No. 233A. Per 2-ounce box, ...	$0 10
233B. Per 4-ounce box, ...	15
233C. Per 1-pound box, ...	40

For description of Paper see page 19. Pasteboard and Metal Tubes for preserving paper listed on page 22.

SOLAR AND ELECTRIC PRINTING DEPARTMENTS

At our various establishments in **Chicago, New York, San Francisco** and **New Orleans** we operate large departments fully equipped for reproducing copies of Tracings and Drawings by **sun** or **electric light.**

We make a specialty of the following kinds of prints, made on either paper or cloth:

Blue Prints (white lines on blue ground).
Vandyke Negatives (white lines on brown ground).
Blue Line Prints (blue lines on white ground).
Black Line Prints (black lines on white ground).
Hektograph Prints

With our improved Vacuum Blue Print Frames the closest contact is secured, enabling us to guarantee perfect results.

Architects, Engineers, etc., in any part of the country, who have no facilities for making Prints, can send their tracings to us, stating kind of Prints wanted and number of copies desired, which will be promptly produced at reasonable prices and returned to sender.

Prices quoted on application. Prints mounted on muslin, hung on rollers, etc., at lowest prices.

ERASING FLUIDS

Erasing Fluid for making alterations

on Blue and on Black Prints.

No. 240. **White Hyperion Erasing Fluid.** For making alterations and additions on blue prints.
Per bottle, ... $0 20

241. **Red Hyperion Erasing Fluid.** For marking or tinting blue prints.
Per bottle, ... $0 20

241½. **Yellow Hyperion Erasing Fluid.** For marking or tinting blue prints.
Per bottle, ... $0 20

242. **Vandyke Erasing Fluid.** For making alterations on Vandyke prints.
Per bottle, ... $0 20

AIR-TIGHT METAL TUBES

For Preserving Paper.

No. 243.

Made of tin, with well fitting covers; for keeping cut rolls of prepared Blue print and Vandyke papers dry and dark, and also well adapted for the safe keeping of valuable plans and tracings.

No. 243.	For 50-yd. rolls,	31 in. long,	Each,	$1 10
244.	"	37 " "	"	1 25
245.	"	43 " "	"	1 35
246.	"	55 " "	"	2 00
243½.	For 10-yd. rolls,	31 " "	"	95
244½.	"	37 " "	"	1 00
245½.	"	43 " "	"	1 10
246½.	"	55 " "	"	1 70

PASTEBOARD TUBES

No. 246A.

These tubes are made with close-fitting caps at each end, and are used for preserving 10-yard rolls of prepared paper, also for mailing and keeping drawings, tracing cloth, etc.

No. 246A.	2 in. diameter,	31 in. long,	Each,	$0 08
246B.	2 "	37 " "	"	09
246C.	2 "	43 " "	"	10
247A.	2½ "	31 " "	"	10
247B.	2½ "	37 " "	"	12
247C.	2½ "	43 " "	"	15

No. 247.

ADHESIVE TAPE

No. 247. **Crowell Adhesive Tape,** made of cloth ¾ in. wide, coated on one side with an adhesive glue compound. Put up in a novel box, so constructed as to preserve it from atmospheric and other deteriorating effects.
Per box of 50 ft., . . $0 25

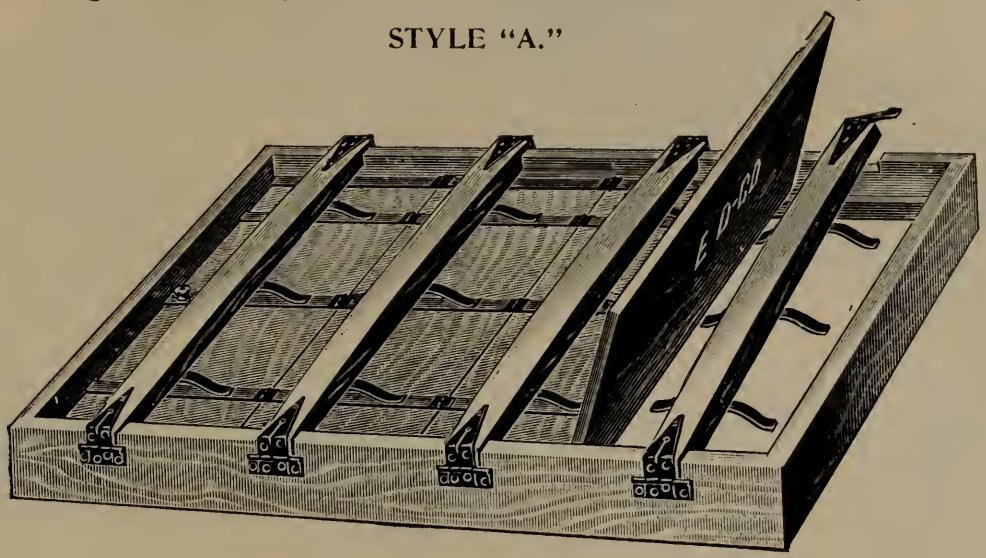
No. 248. **Dennison's Adhesive Transparent Tape.** Strip of Paper 4 ft. long, ¾ in. wide, gummed on one side, on spool with metal holder.
Per dozen spools, . . $0 60

BLUE PRINT FRAMES

SUPERIOR QUALITY OF HARDWOOD

The Blue Print Frames manufactured by us are made of carefully selected, thoroughly seasoned hardwood, are of perfect workmanship and combine all the latest improvements. They are made to stand exposure to the weather incidental to their use, and are less liable to warp and shrink, and thereby break the glass, than any other frame made.

STYLE "A."



No. 254.

Made of selected Hardwood, highly finished, with hinged bars and brass springs.

	Inside Dimensions of Frame.	Printing Surface.		Frame Only.	With Felt Pad.	With Felt Pad and Double Thick Glass.	With Felt Pad and Polished Plate Glass.
No. 250.	21½×25½ in.	20 × 24 in.	Each,	$6 20	$ 6 85	$ 7 90	$ 9 00
251.	25½×31½ "	24 × 30 "	"	8 00	9 00	10 80	13 50
252.	25½×37½ "	24 × 36 "	"	9 50	10 75	.....	17 80
253.	32 ×44 "	30 × 42 "	"	12 50	14 25	.....	22 50
253A.	38 ×50 "	36 × 48 "	"	16 00	18 25	.....	34 00
254.	38 ×62 "	36 × 60 "	"	20 00	23 00	.....	42 25
254A.	44 ×62 "	42 × 60 "	"	22 50	25 80	.....	46 80
254B.	45 ×75 "	42 × 72 "	"	29 00	33 20	.....	61 00

Other sizes made to order.

In ordering Frames, please state whether felt pad and double thick or polished plate glass is desired, or none.

We recommend ordering the Plate Glass, because it is more perfect and lasting than Double Thick Glass.

The Glass is carefully packed by an expert, but we are not responsible for breakage of glass in transit.

BLUE PRINT FRAMES FOR PATENT OFFICE DRAWINGS, ETC.

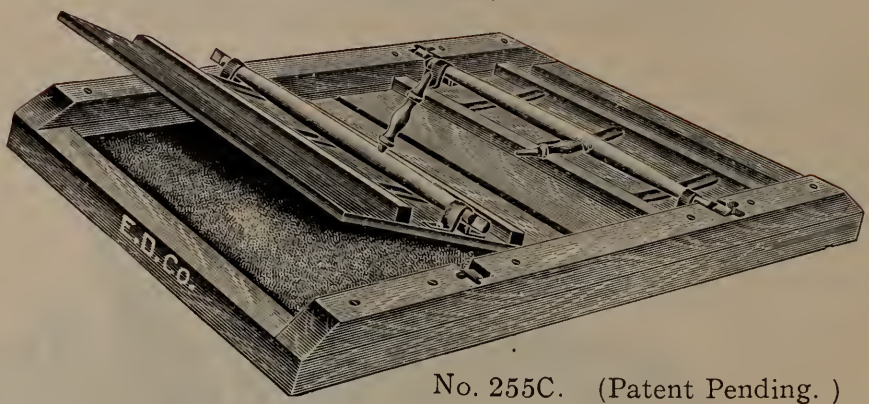
No. 252A.	11 × 16 inches, with double thick glass and pad, .	Each,	$2 75
252B.	16 × 21 " with double thick glass and pad, .	"	4 75

FELT FOR PRINTING FRAMES

No. 255.	70 inches wide, ¼ inch thick, ...	Per yard,	$3 00
256.	70 " " ⅜ " "	" "	4 50

BLUE PRINT FRAMES *Continued*

STYLE "B."

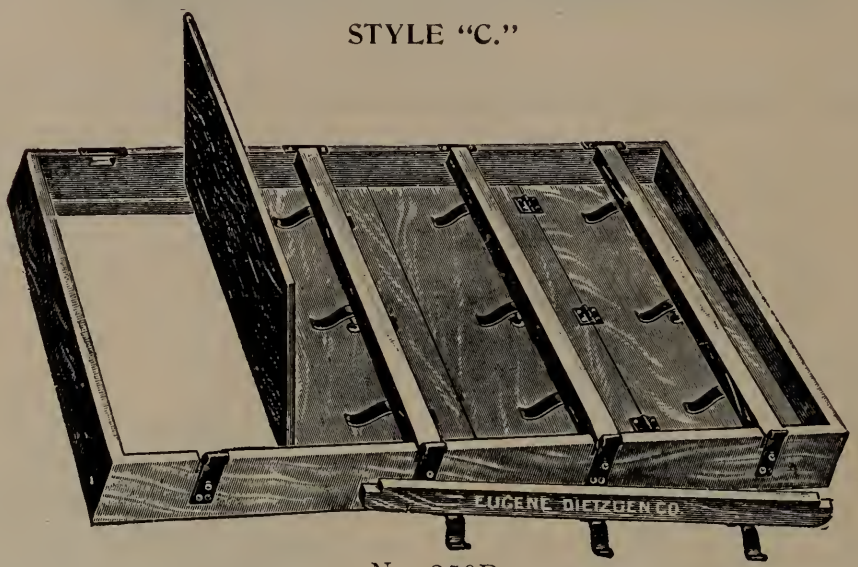


No. 255C. (Patent Pending.)

These Frames differ from the ordinary construction in that the springs are fastened to the back instead of the usual cross bars, and the necessary tension—to produce good contact—is applied by a new clamping device, of simple construction, which eliminates the cross bars and is rapidly and easily operated.

	Printing Surface.		Frame Only.	With Felt Pad.	With Felt Pad and Double Thick Glass.	With Felt Pad and Polished Plate Glass.
No. 255A.	20 × 24 in.	Each,	$ 7 40	$ 8 10	$ 9 20	$10 25
255B.	24 × 30 "	"	9 50	10 50	12 25	15 00
255C.	24 × 36 "	"	11 50	12 75		19 80
255D.	30 × 42 "	"	14 50	16 25		24 50

STYLE "C."



No. 256D.

Made of Hardwood, with separate bars and brass springs.

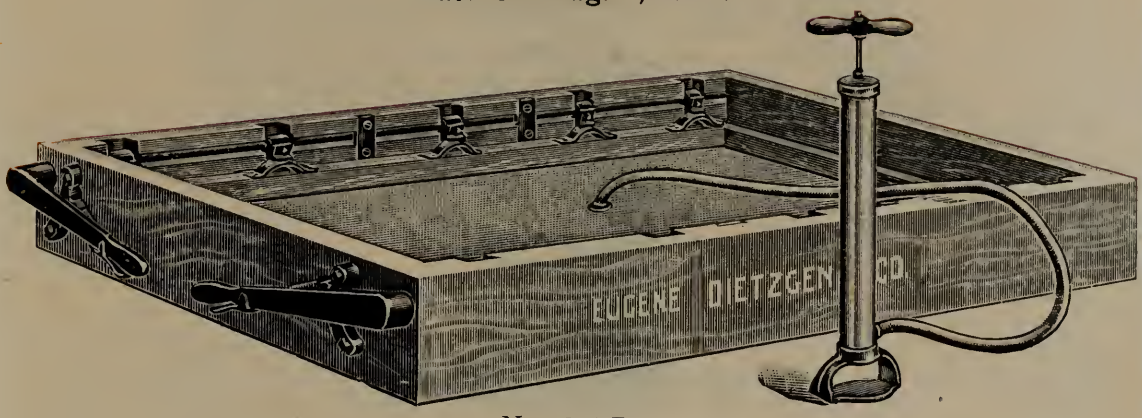
	Inside Dimensions of Frame.	Printing Surface.		Frame Only.	With Felt Pad.	With Felt Pad and Double Thick Glass.	With Felt Pad and Polished Plate Glass.
No. 256A.	21½ × 25½ in.	20 × 24 in.	Each,	$ 5 50	$ 6 15	$ 7 20	$ 8 25
256B.	25½ × 31½ "	24 × 30 "	"	6 85	7 85	9 60	12 40
256C.	25½ × 37½ "	24 × 36 "	"	8 30	9 50		16 60
256D.	32 × 44 "	30 × 42 "	"	11 00	12 75		21 00
256E.	38 × 50 "	36 × 48 "	"	13 25	15 50		31 25
256F.	38 × 62 "	36 × 60 "	"	17 50	20 50		39 75

In ordering Frames, please state whether felt pad and double thick or polished plate glass is desired, or none.

BLUE PRINT FRAMES *Continued*

VACUUM FRAMES

Patented Aug. 7, 1906.



No. 257B.

Our Vacuum Frames are made of thoroughly seasoned hardwood, with steel mountings, and include a specially constructed air-proof rubber cushion with pad, exhaust valve, hose and pump, by means of which the air is entirely exhausted between the cushion and glass, insuring good contact.

They are particularly well adapted for Vandyke Negative and Positive printing, also for printing off large tracings, which are very liable to wrinkle in ordinary spring frames, resulting in blurred prints. With our Vacuum Frames this defect is eliminated, as perfect contact of paper and tracing with glass is secured, and, as the atmospheric pressure is the same on both sides of the glass, it obviates the danger of breakage, which frequently occurs with ordinary spring or air cushion frames.

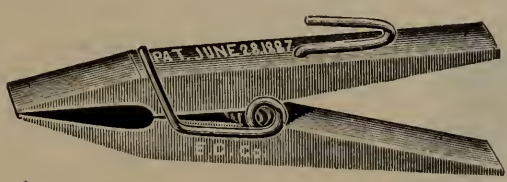
		Inside Dimensions of Frame.	Printing Surface.		Without Glass.	With Polished Plate Glass.
No. 257A.	Vacuum Frame,	32 × 44 in.	30 × 42 in.	Each,	$55 00	$ 63 50
257AL.	" "	38 × 50 "	36 × 48 "	"	64 50	80 50
257B.	" "	38 × 62 "	36 × 60 "	"	72 00	92 00
257C.	" "	45 × 75 "	42 × 72 "	"	97 50	125 75

Other sizes made to order.

In ordering, please state whether Frame is desired with or without glass.

For Vacuum Exhaust Tanks with Pumps, etc., for use in connection with these Frames, see next page.

SPRING CLIPS



No. 259.

No. 259. Spring Clips, for clamping prints when drying, . Per doz., $0 25

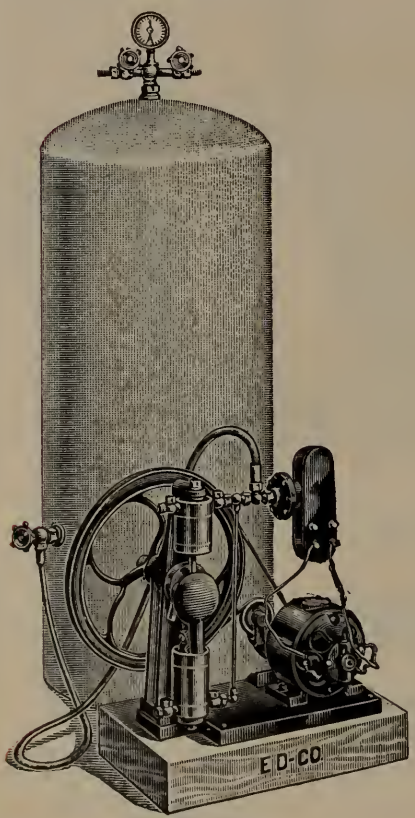
VACUUM EXHAUST TANK OUTFITS

For use in connection with our Vacuum Blue Print Frames Nos. 257A-257C.

No. 260A.

No. 260A. Vacuum Tank Outfit, consisting of metal Tank, Hand Pump, Gauge, etc. . . . . Each, $35 00

This outfit is similar to No. 260B, but of much smaller capacity and cheaper construction, and is not equipped with a motor, consequently must be operated by hand.



No. 260B.

No. 260B. Patent Automatic Vacuum Outfit, with large steel Tank, Motor (110-volt D. C.) Double Acting Pump, Gauge, Automatic Controller, etc. . . . Each, $200 00

Outfit No. 260B consists of an exhaust tank, with motor and all necessary accessories, by means of which the air is **automatically** exhausted from the printing frames, no manual labor being required. A connection is made between the tank and the frame or frames used, by iron pipe or rubber hose, and the frames are automatically kept at a vacuum during use.

Stock Automatic Tank Outfits are equipped with 110-volt Direct Current motor, but motors for any other voltage furnished to order.

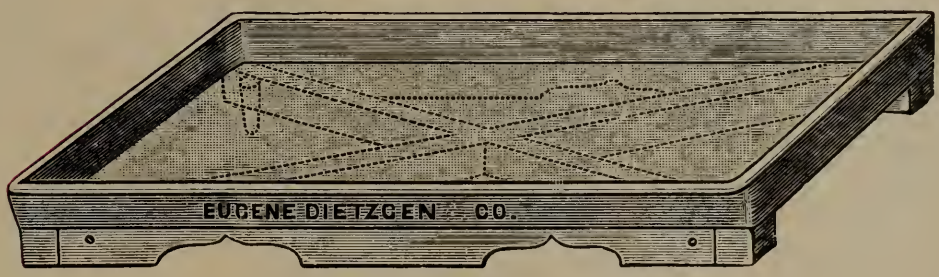
SUPERIOR LEAD LINED BATH TRAYS

No. 262A.

The Frame is of substantial hardwood construction and is lined with sheet lead. Superior to all other trays, as chemicals or acids will not corrode lead, while they are injurious to other metals. Especially adapted for washing and fixing "Vandyke" prints.

No. 262A.	Bath Tray, lead lined,	20 × 24 inches,	Each, $ 5 90
262B.	" " " "	24 × 30 "	" 7 25
262C.	" " " "	30 × 42 "	" 9 50
262D.	" " " "	36 × 60 "	" 13 80
262E.	" " " "	42 × 60 "	" 18 40
262F.	" " " "	45 × 75 "	" 23 50

GALVANIZED IRON BATH TRAYS



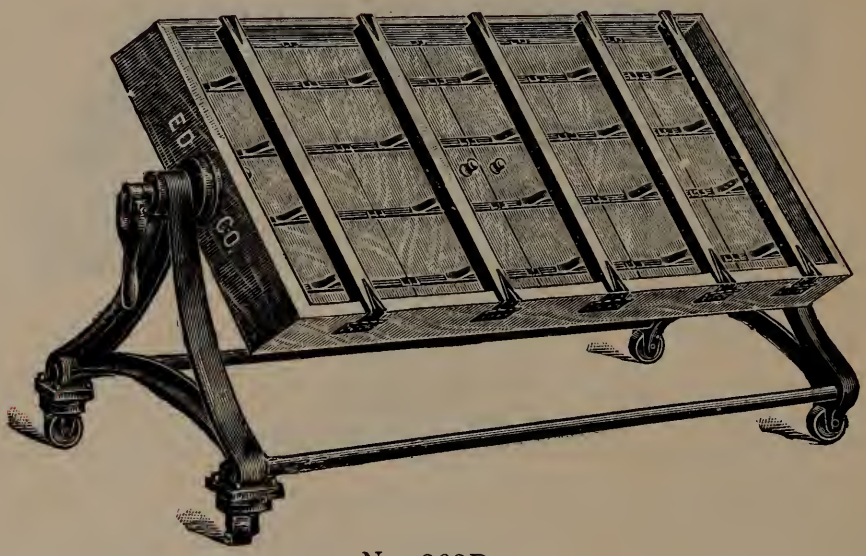
No. 264A.

With Drain Pipe, strong Rim and Wooden Braces.

No. 264A.	Bath Tray,	20 × 24 inches,	Each, $3 75
264B.	"	24 × 30 "	" 4 70
264C.	"	30 × 42 "	" 6 20
264D.	"	36 × 60 "	" 8 25
264E.	"	42 × 60 "	" 10 35
264F.	"	45 × 75 "	" 12 75

Other sizes made to order.

FRAMES ON WHEEL CARRIAGES



No. 263D.

These Carriages are made of iron in a very practical and substantial manner. The Frames are the same as those listed under Nos. 250 to 254B, but are mounted so that they revolve in the uprights of the carriage and can be clamped in any position to receive the direct rays of the sun.

Carriage with Style "A" Frame.

	Inside Dimensions of Frame.	Printing Surface.		Without Glass or Felt Pad.	With Felt Pad.	With Felt Pad and Polished Plate Glass.
No. 263A.	25½ × 37½ in.	24 × 36 in.	Each,	$30 50	$31 75	$38 75
263B.	32 × 44 "	30 × 42 "	"	34 00	35 75	44 00
263C.	38 × 50 "	36 × 48 "	"	39 50	41 75	57 50
263D.	38 × 62 "	36 × 60 "	"	45 00	48 00	67 25
263E.	44 × 62 "	42 × 60 "	"	48 50	51 80	72 80
263F.	45 × 75 "	42 × 72 "	"	56 00	60 20	88 00

Carriage with Vacuum Frame.

	Inside Dimensions of Frame.	Printing Surface.		Without Glass.	With Polished Plate Glass.
No. 263K.	32 × 44 in.	30 × 42 in.	Each,	$76 50	$ 85 00
263L.	38 × 50 "	36 × 48 "	"	88 00	103 75
263M.	38 × 62 "	36 × 60 "	"	97 00	116 50
263N.	45 × 75 "	42 × 72 "	"	123 50	151 50

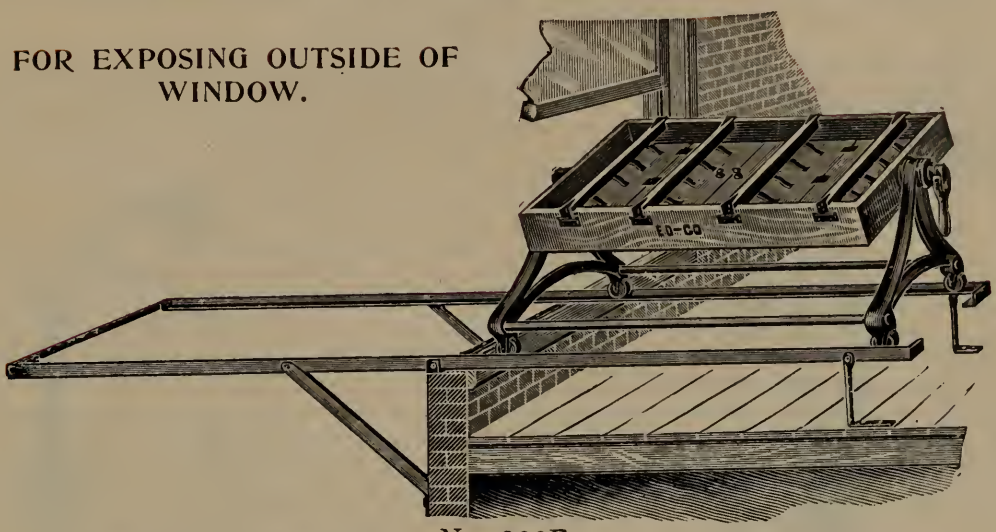
These Vacuum Frames are the same as those listed under Nos. 257A to 257C and include rubber cushion with pad, exhaust valve, hose and pump.

Other sizes made to order.

In ordering, please state whether Frame is desired with or without glass.

FRAMES WITH CARRIAGES ON RAILS

FOR EXPOSING OUTSIDE OF WINDOW.



No. 266E.

This is the most practical and durable track arrangement upon which frames on Carriages may be run out of a window for exposure. The carriage is of substantial iron construction, of new design, and runs on four iron wheels. The rails usually furnished are of angle iron, but we can also furnish them of channel iron if so ordered. The frames are the same as those listed under Nos. 250 to 254B, but are mounted so that they revolve in the uprights of the carriage and can be clamped in any position.

Style "A" Frame and Carriage complete with iron rails and supports:

		Inside Dimensions of Frame.	Printing Surface.		Without Glass or Felt Pad.	With Felt Pad.	With Felt Pad and Polished Plate Glass.
No. 266E.	Frame,	32 × 44 in.	30 × 42 in.	Each,	$37 50	$39 25	$47 50
266F.	"	38 × 50 "	36 × 48 "	"	45 00	47 25	63 00
266G.	"	38 × 62 "	36 × 60 "	"	51 50	54 50	73 75
266H.	"	45 × 75 "	42 × 72 "	"	65 00	69 25	97 00

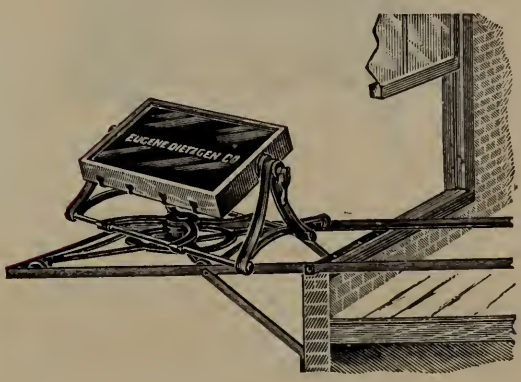
In ordering, please state clear aperture of window, width of window sill, height of window sill from floor, and thickness of wall.

Vacuum Frame and Carriage complete with iron rails and supports:

		Inside Dimensions of Frame.	Printing Surface.		Without Glass.	With Polished Plate Glass.
No. 266K.	Vacuum Frame,	32 × 44 in.	30 × 42 in.	Each,	$ 81 00	$ 89 50
266L.	" "	38 × 50 "	36 × 48 "	"	93 50	109 50
266M.	" "	38 × 62 "	36 × 60 "	"	104 50	124 00
266N.	" "	45 × 75 "	42 × 72 "	"	133 00	161 00

These Vacuum Frames are the same as those listed under Nos. 257A to 257C and include rubber cushion with pad, exhaust valve, hose and pump.

In ordering, please state clear aperture of window, width of window sill, height of window sill from floor, and thickness of wall.



TURNTABLE CARRIAGE.

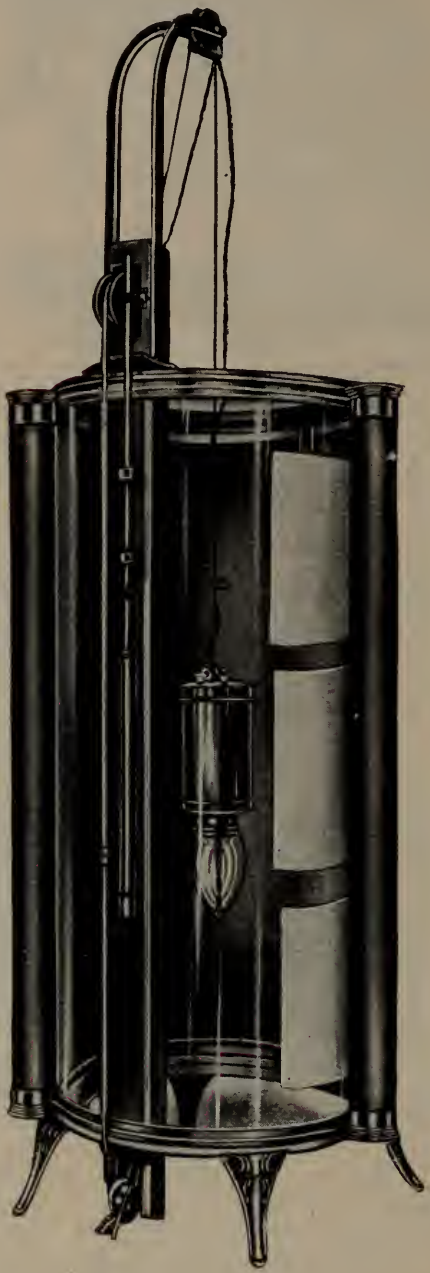
The above frames can be furnished with our improved iron turntable carriage as shown in this cut, which can be set to receive the direct rays of the sun

No. 266T. Turntable Carriage, add to the above prices, Each, $20 00

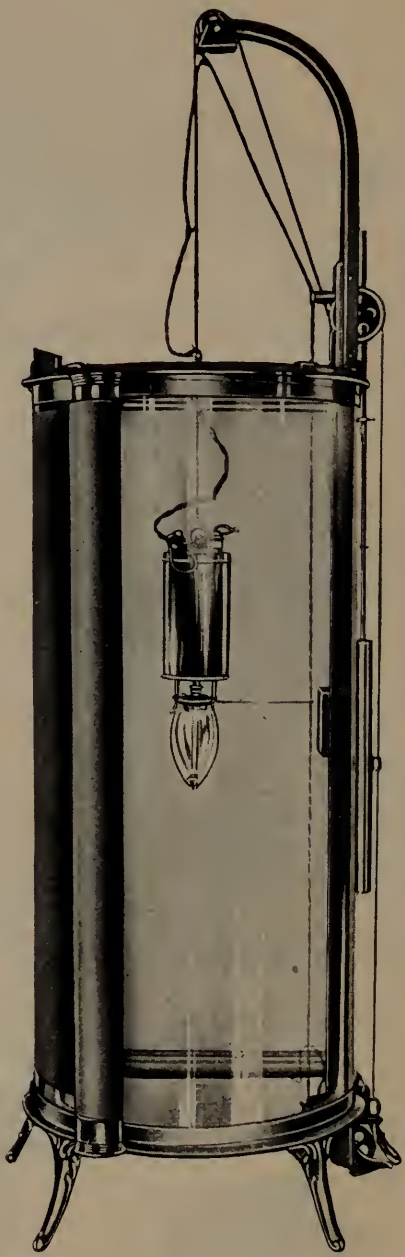
CYLINDRICAL ELECTRIC BLUE PRINT MACHINES

With Patent Roller Curtain.

These Electric Blue Printing Machines were designed to meet the growing demand for well constructed and thoroughly efficient apparatus for reproducing drawings and tracings at any time during the day or night, independent of weather conditions.



No. 267C.—Type "W."



No. 267E.—Type "X."

In the construction of these machines we have attained both practicability and simplicity, and by referring to illustrations and description, their superiority to machines of other make can readily be determined.

ELECTRIC BLUE PRINT MACHINES *Continued*

TYPE "W."

Description: It is of the cylindrical type, consisting of two sections of curved plate glass forming a cylinder, with an arc lamp arranged to descend axially through the cylinder, thereby giving **equal light radiation** on the interior surface of the cylinder, and hence a uniform exposure of the blue print paper.

The **Roller Curtain device** (patented) by which the tracings and sensitized paper are held in place, is by far the most efficient, convenient and accessible means ever devised for the purpose. The Roller stands perfectly still except when pushed along by hands or knee, **thus leaving both hands of the operator free** to adjust the tracings and paper. This device is particularly convenient for making a number of small prints; the illustration showing a partly filled cylinder. The roller curtain holds the tracings and paper so securely against the glass that at any time the rollers can be partly rolled back, permitting **an examination of the prints** without in any way disturbing the position of the tracings with respect to the prints, on the same principle as the old sun frames. This provision is only necessary, however, when using tracings of mixed transparency—old and soiled tracings requiring longer exposures than new ones.

The **Hydraulic Speed Regulator** secures an **absolutely uniform speed** at all times. It also provides a **wide range of speed regulation,** so that the machine may be adjusted to meet all possible requirements. By means of a valve regulator, the speed can be varied either before or after turning on the current. The machine is noiseless in operation.

The **Arc Lamp** furnished with the machine is of a special pattern and the best adapted for the purpose. It gives the highest actinic effect and a strong, uniform and steady light.

The machine is entirely **self=contained,** the mechanism not being dependent upon side walls or ceiling fixtures of any kind. On account of this feature, it can be placed in any part of a room desired. It occupies a **floor space only three feet square.**

This machine is designed on the **only correct principles of light radiation** and it excels in that it will print **small or large prints** with equal facility and perfection.

These machines are furnished all complete so that when set up, connection with the feed wire is only required.

No. 267C.	Type "W," capacity two prints, each 42×60 in.	Each, $280 00
267D.	Type "W," capacity two prints, each 42×72 in.	" 325 00

When ordering state voltage and whether direct or alternating current is used.

TYPE "X."

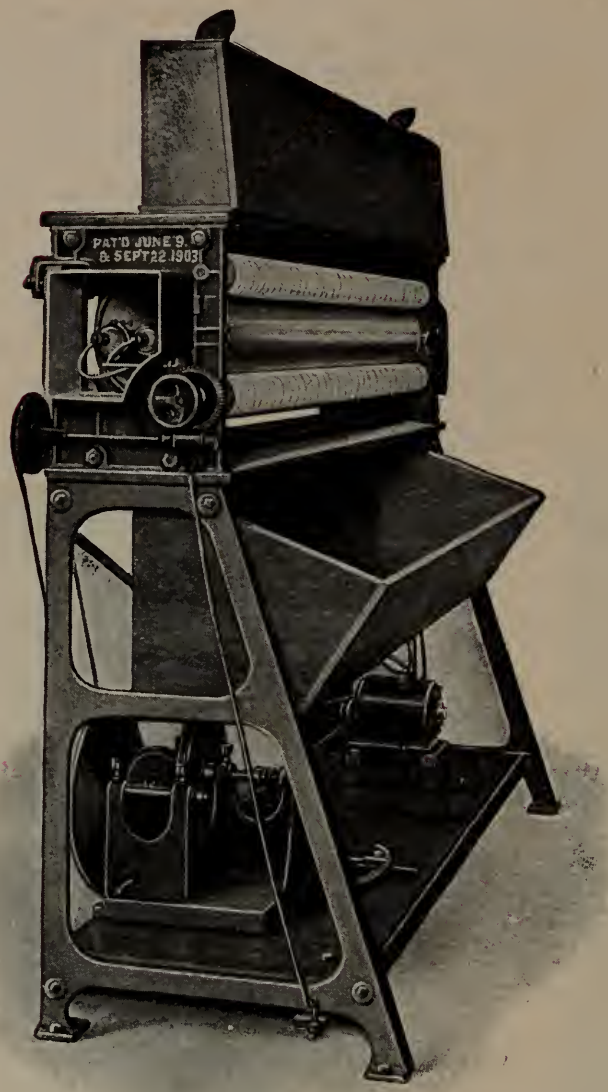
To meet a large demand machines have been designed with one curved plate glass, which print but one sheet 42 x 60 or 42 x 72 inches or equivalent area at each exposure, and which sell at correspondingly lower prices. The controlling mechanism of this type is exactly the same as that used on the machines described above.

No. 267E.	Type "X," capacity one print, 42×60 in. . . .	Each, $200 00
267F.	Type "X," capacity one print, 42×72 in. . . .	" 220 00

When ordering state voltage and whether direct or alternating current is used.

Above prices include packing for shipment. We are not responsible for breakage of glass in transit.

EVERETT-McADAM CONTINUOUS ELECTRIC BLUE PRINT MACHINE



No. 268R.

The cylinder in the Blue Print Machine is 8 inches in diameter and from 3 to 6 inches longer than the width of the paper to be printed. Two mercury vapor lamps, made to order for this machine and double the power of the standard lamp, pass through the center of the cylinder. The light, therefore, strikes the paper perpendicularly on the concave surface and directly through the glass, no light being absorbed by having to pass through so-called "transparent" aprons or belts. This, with the high actinic value of the Mercury Vapor lamps, produces a machine of an absolutely maximum electrical efficiency.

The lamps are no more trouble to maintain than an incandescent lamp, since there are no carbons to renew as in arc lamps.

The machine will run on any direct current and the motor which operates it runs on the same circuit. The lamps require 7 amperes each on 110 volts and the motor 1.8 amperes

The Everett-McAdam Machine is entirely self-contained and is shipped all set up, except that the lamps and cylinder are packed separately in boxes in the main crate. Any electrician can connect the lamps from instructions sent with the machine.

The space occupied is about 2 x 5 ft. for the 42″ machine, and 2 x 6½ ft. for the 54″ machine, and since the paper feeds in automatically, it is not necessary to have a large table on which to cut it, as with the old methods of printing.

The machine is driven by a motor through a variable speed device which is operated by moving a convenient lever, so that any tracing or paper can be used and run through at the speed which gives the best results.

No. 268R.	E-M. Blue Print Machine for 42 in. paper, . .	Each,	$650 00
268S.	" " " " " 54 " " . .	"	875 00

Above prices include packing for shipment.

"PERFECT" PROFILE PAPERS AND CLOTHS

(Reduced facsimiles of our labels.)

Our **"Perfect" Profile and Cross Section Papers** are printed on a superior quality of paper made expressly for this purpose, and being printed from engraved rollers, are unexcelled for distinctness, accuracy and uniformity.

The Profile and Cross Section **Tracing Papers** and **Cloths,** which were first introduced by us, are especially adapted for use by engineers on construction, to transmit monthly progress of work, by tracing from their field profile without having to do so much ruling. Printed in Orange and Green, except as specified.

All our Profile Papers bear the trade mark "Perfect" along their edge.

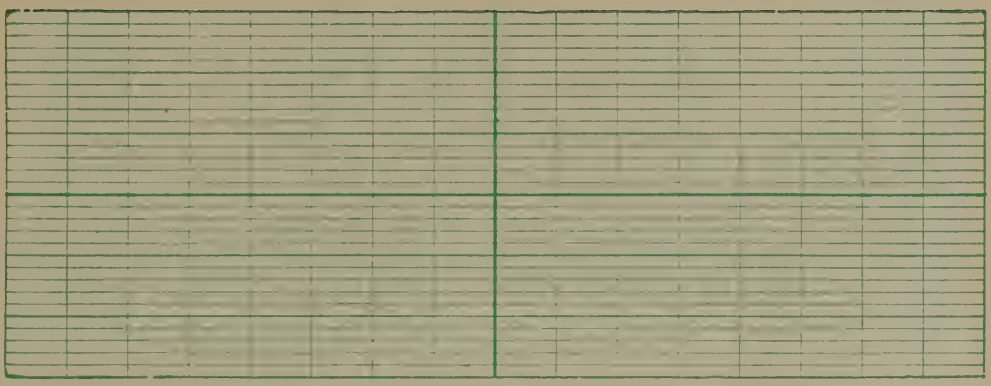


Plate A, 4 × 20 to one inch.

CONTINUOUS.

	Engraving				Roll.	Yard.
No. 270 Green. On Drawing Paper,	20	in. wide,	50	yd. rolls,	$10 00	$0 24
270 Orange. " " "	20	"	50	"	10 00	24
270½ Green. " " "	10	"	50	"	6 25	15
270½ Orange. " " "	10	"	50	"	6 25	15
271 Green. Mounted on Muslin,	20	"	20	"	10 00	60
271 Orange. " " "	20	"	20	"	10 00	60
271½ Green. " " "	10	"	20	"	6 75	40
271½ Orange. " " "	10	"	20	"	6 75	40
272 Green. On **Hyperion Cloth,**	20	"	20	"	10 00	60
272 Orange. " " "	20	"	20	"	10 00	60
275 Orange. On **Tracing Paper,**	20	"	50	"	10 00	24
275½ Orange. " " "	10	"	50	"	6 25	15
276 Orange. On **Tracing Cloth,**	20	"	20	"	12 50	75

Samples of Profile and Cross Section Papers and Cloths mailed on application, or general Sample Book for 15 cents.

"PERFECT" PROFILE PAPERS AND CLOTHS *Continued*

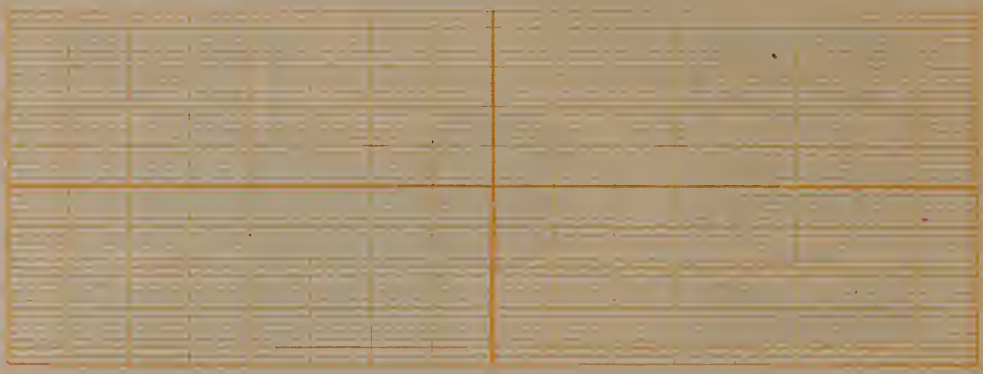
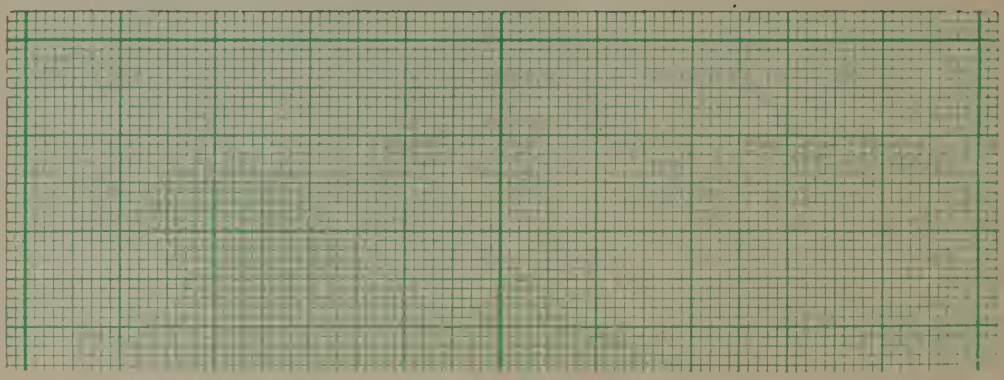


Plate B, 4 × 30 to one inch.

CONTINUOUS.

		Engraving				Roll.	Yard.
No. 280	Green. On Drawing Paper,	20	in. wide,	50	yd. rolls,	$10 00	$0 24
280	Orange. " " "	20	"	50	"	10 00	24
280½	Green. " " "	9	"	50	"	6 25	15
280½	Orange. " " "	9	"	50	"	6 25	15
281	Green. Mounted on Muslin,	20	"	20	"	10 00	60
281	Orange. " " "	20	"	20	"	10 00	60
281½	Green. " " "	9	"	20	"	6 75	40
281½	Orange. " " "	9	"	20	"	6 75	40
282	Green. On **Hyperion Cloth,**	20	"	20	"	10 00	60
282	Orange. " " "	20	"	20	"	10 00	60
285	Orange. On **Tracing Paper,**	20	"	50	"	10 00	24
285½	Orange. " " "	9	"	50	"	6 25	15
286	Orange. On **Tracing Cloth,**	20	"	20	"	12 50	75



Millimeter.

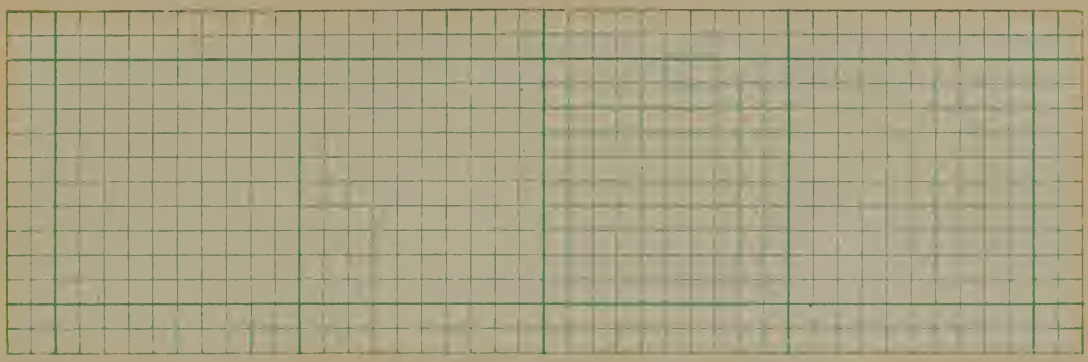
CONTINUOUS.

		Engraving				Roll.	Yard.
No. 300	Green. On Drawing Paper,	50	cm. wide,	50	yd. rolls,	$10 00	$0 24
300	Orange. " " "	50	"	50	"	10 00	24
301	Green. Mounted on Muslin,	50	"	20	"	10 00	60
301	Orange. " " "	50	"	20	"	10 00	60
305	Orange. On **Tracing Paper,**	50	"	50	"	10 00	24
306	Orange. On **Tracing Cloth,**	50	"	20	"	12 50	75

Samples of Profile and Cross Section Papers and Cloths mailed on application, or general Sample Book for 15 cents.

"PERFECT"
CROSS SECTION PAPERS AND CLOTHS
IN ROLLS AND SHEETS.

All our Printed Cross Section Papers bear the trade mark "Perfect" along their edge.



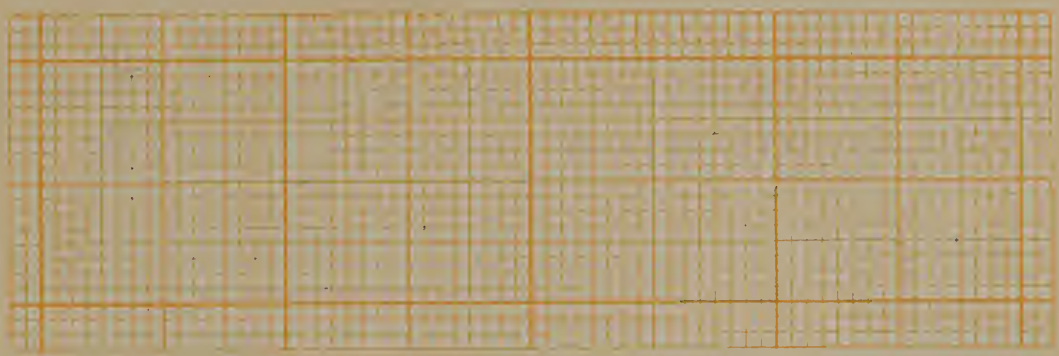
Nos. 307-311. 10 × 10 to one inch.

CONTINUOUS.

		Engraving			Roll.	Yard
No. 307	Green.	On Drawing Paper,	20 in. wide,	50 yd. rolls,	$10 00	$0 24
307	Orange.	" " "	20 " "	50 "	10 00	24
308	Green.	Mounted on Muslin,	20 " "	20 "	10 00	60
308	Orange.	" " "	20 " "	20 "	10 00	60
308½	Green.	On **Hyperion Cloth,**	20 " "	20 "	10 00	60
308½	Orange.	" " "	20 " "	20 "	10 00	60
309	Orange.	On **Tracing Paper,**	20 " "	50 "	10 00	24
309½	Orange.	On **Tracing Cloth,**	20 " "	20 "	12 50	75

SHEETS.

				Quire.	Sheet.
No. 310	Green.	On Ledger Paper, engraving	16 × 20 in.,	$3 50	$0 20
310	Orange.	" " " "	16 × 20 "	3 50	20
311	Orange.	On **Tracing Paper,** "	16 × 20 "	3 50	20



Nos. 315-319. 16×16 to one inch.

CONTINUOUS.

		Engraving			Roll.	Yard.
No. 315	Green.	On Drawing Paper,	20 in. wide,	50 yd. rolls,	$10 00	$0 24
315	Orange.	" " "	20 " "	50 "	10 00	24
316	Green.	Mounted on Muslin,	20 " "	20 "	10 00	60
316	Orange.	" " "	20 " "	20 "	10 00	60

SHEETS.

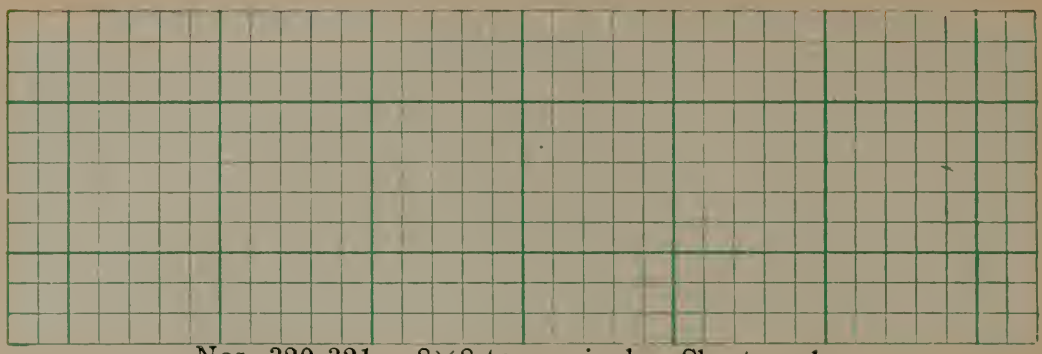
				Quire.	Sheet.
No. 318	Green.	On Ledger Paper, engraving	16 × 21 in.,	$3 50	$0 20
318	Orange.	" " " "	16 × 21 "	3 50	20
319	Orange.	On **Tracing Paper,** "	16 × 21 "	3 50	20

Samples of Profile and Cross Section Papers and Cloths mailed on application, or general Sample Book for 15 cents.

"PERFECT" CROSS SECTION PAPERS

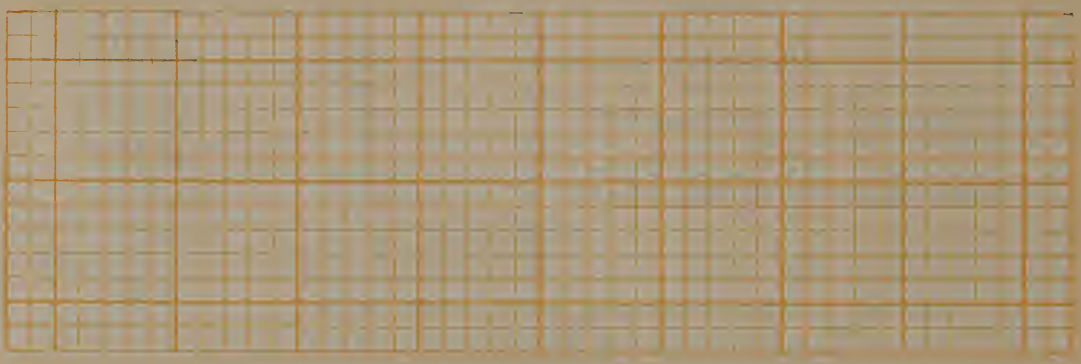
Continued

IN SHEETS ONLY.



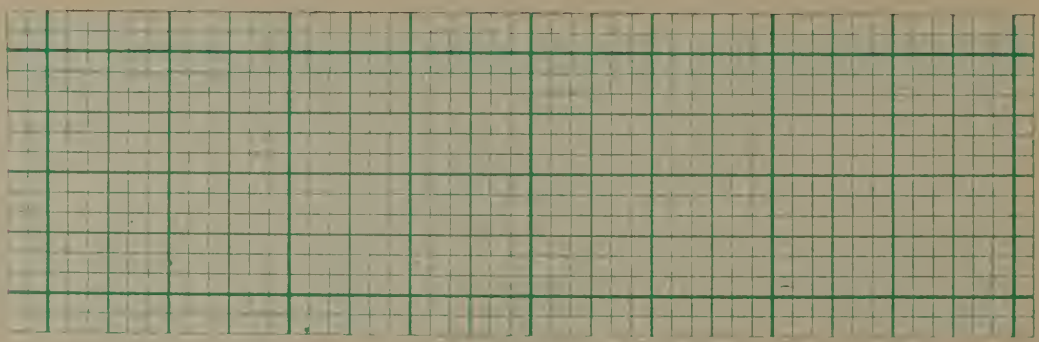
Nos. 320-321. 8×8 to one inch. Sheets only.

		Quire.	Sheet.
No. 320 Green.	On Ledger Paper, engraving $16\frac{1}{4}\times21\frac{7}{8}$ in., .	$3 50	$0 20
320 Orange.	" " " " $16\frac{1}{4}\times21\frac{7}{8}$ " .	3 50	20
321 Orange.	On **Tracing Paper,** " $16\frac{1}{4}\times21\frac{7}{8}$ " .	3 50	20



Nos. 340-341. 5×5 to $\frac{1}{2}$ inch. Sheets only.

		Quire.	Sheet.
No. 340 Green.	On Ledger Paper, engraving 16×20 in., .	$3 50	$0 20
340 Orange.	" " " " 16×20 " .	3 50	20
341 Orange.	On **Tracing Paper,** " 16×20 " .	3 50	20



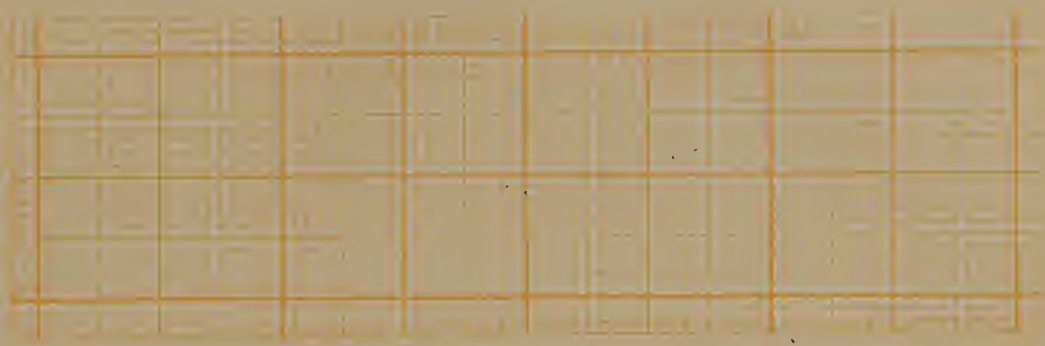
No. 342. 12 × 12 to one inch. Sheets only.

		Quire.	Sheet.
No. 342 Green.	On Ledger Paper, engraving 16 × 20 in., .	$3 50	$0 20

Samples of Cross Section Papers mailed on application, or general Sample Book for 15 cents.

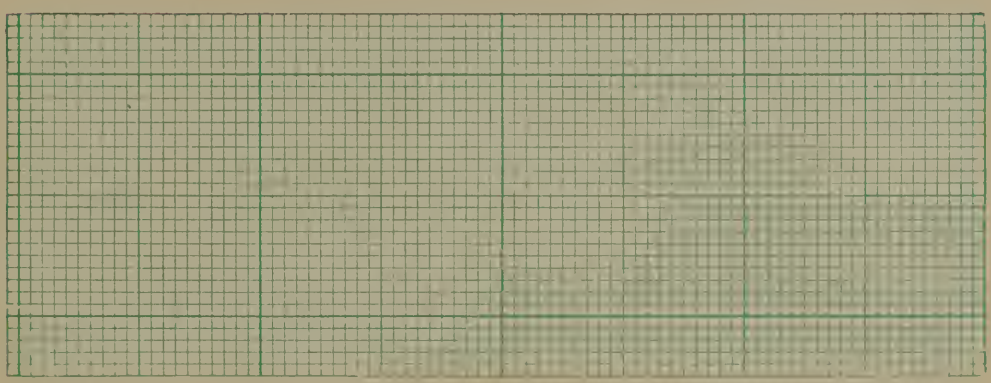
CONSTRUCTOR'S CROSS SECTION PAPERS

For use of students, mechanical engineers, etc.



Nos. 343-346D. 10 × 10 to ½ inch. Every fifth line heavy.

			100 sheets.	Quire.
No. 343.	Engraving 5 × 7 in., on drawing paper,	green only,	$0 90	$0 25
344.	" 5 × 7 " " tracing "	orange "	90	25
344A.	" 5 × 7½ " " drawing "	green "	90	25
344B.	" 5 × 7½ " " tracing "	orange "	90	25
345.	" 7 × 10 " " drawing "	green "	1 20	30
346.	" 7 × 10 " " tracing "	orange "	1 20	30
346A.	" 7½ × 10 " " drawing "	green "	1 20	30
346B.	" 7½ × 10 " " tracing "	orange "	1 20	30
346C.	" 10 × 15 " " drawing "	green "	2 40	75
346D.	" 10 × 15 " " tracing "	orange "	2 40	75



Nos. 347-350. 20 × 20 to one inch. Every tenth line heavy.

			100 sheets.	Quire.
No. 347.	Engraving 5 × 7 in., on drawing paper,	green only,	$0 90	$0 25
348.	" 5 × 7 " " tracing "	orange "	90	25
349.	" 7 × 10 " " drawing "	green "	1 20	30
350.	" 7 × 10 " " tracing "	orange "	1 20	30

Nos. 351-352. 5 × 5 to one inch.

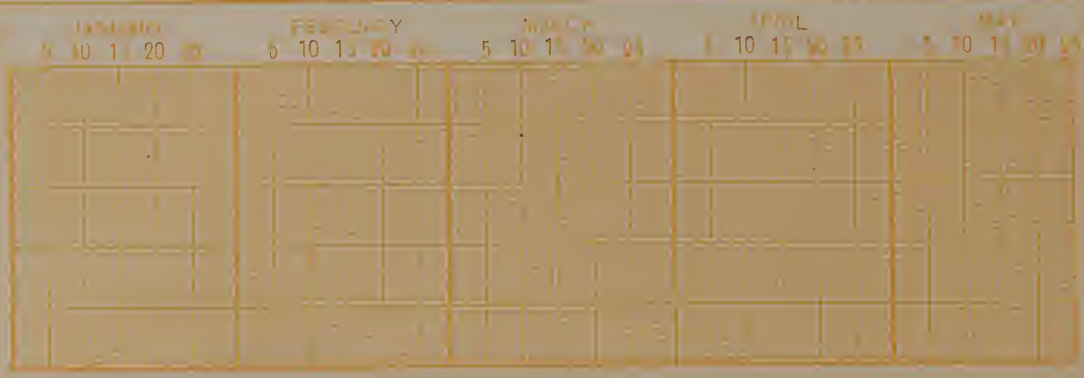
			100 sheets.	Quire.
No. 351.	Engraving 8 × 10 in., on drawing paper,	green only,	$1 75	$0 50
352.	" 8 × 10 " " tracing "	orange "	1 75	50

The printed cross section papers are more reliable and accurate than the ruled cross section papers and of a better stock of paper.

Samples of Cross Section Papers mailed on application, or general Sample Book for 15 cents.

RECORD SHEETS

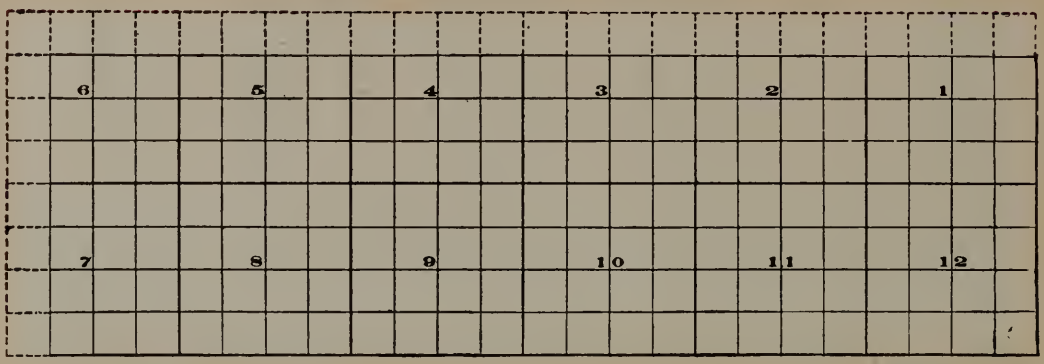
Statistical Diagrammatic Charts for Progress of Work.



No. 353-354.

			100 sheets.	Quire.
No. 353.	Engraving 7 × 12 in., on	drawing paper, green only,	$4 75	$1 35
354.	" 7 × 12 " "	tracing " orange "	4 75	1 35

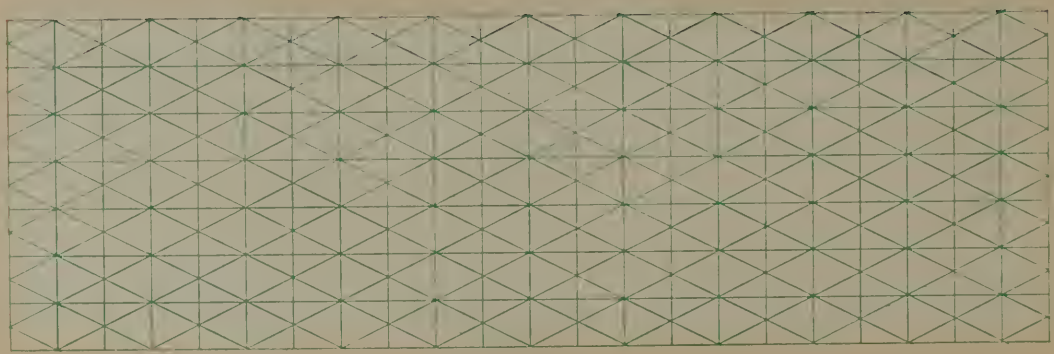
TOWNSHIP PAPER



			Quire.	Sheet.
No. 355.	Engraving 6×6 in.,	scale 1 in. to 1 mile, black only,	$0 75	$0 05
356.	" 12×12 " "	2 " " 1 " " "	1 50	10

ISOMETRIC SKETCHING PAPER

For making Drawings and Sketches in Isometric Perspective. Ruled.

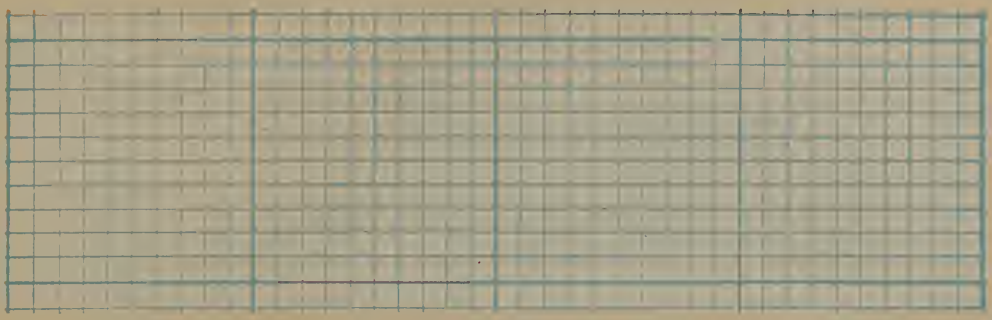


No. 358A.

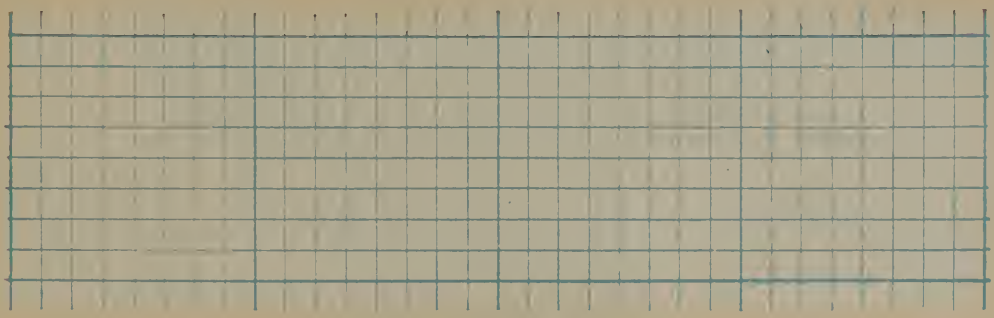
No. 358A.	Ruled in green, in	sheets 12 × 18 in., . Per 40 sheets,	$1 20
358B.	" " " "	pads of 40 sheets, 6 × 9 in., . Each,	30
358C.	" " " " " "	" 40 " 9 ×12 " . "	60

For book on Practical Perspective, see No. 7541.

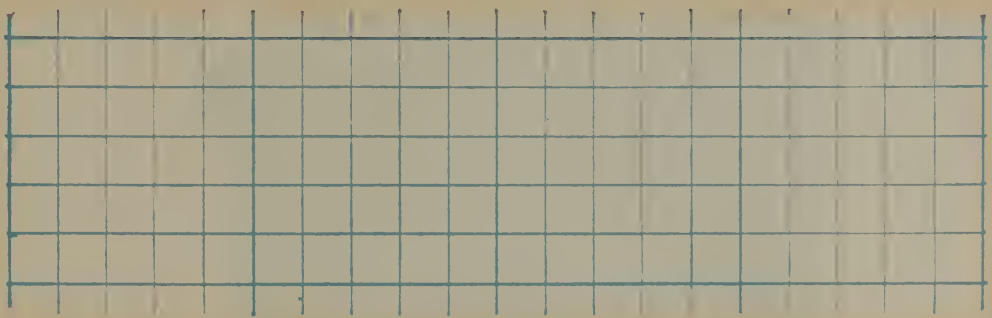
RULED CROSS SECTION PAPERS



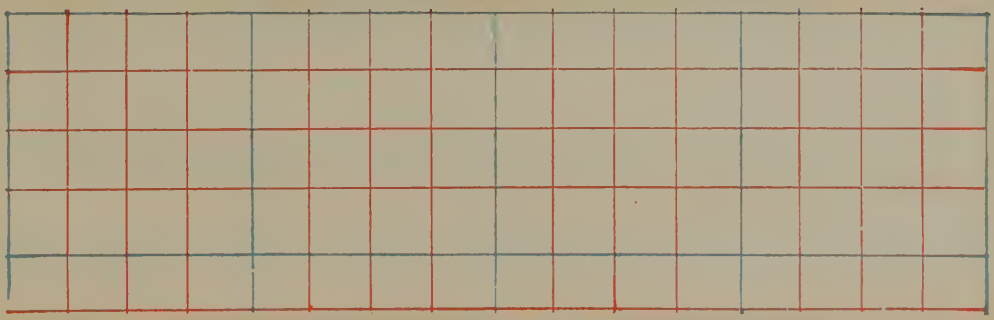
No. 360. In sheets, 16×21 in., ruled in blue, 10×10 to one inch. Per quire, $1 00



No. 362. In sheets, 16×21 in., ruled in blue, 8×8 to one inch. Per quire, $1 00



No. 364. In sheets, 16×21 in., ruled in blue, 5×5 to one inch. Per quire, $1 00



No. 366. Topographical Paper, 16×21 in., 400 feet to one inch, ruled in blue and red, ... Per quire, $1 00

The Ruled Cross Section Papers are not as reliable as the Printed Cross Section Papers.

Samples of Cross Section Papers mailed on application, or general Sample Book for 15 cents.

CROSS SECTION BLOCKS

Of Printed Cross Section Paper.

			Each.
No. 367.	5 × 7 in.,	10 × 10 to one inch, 24 sheets, printed in green, .	$0 75
368.	5 × 7 "	8 × 8 " 24 " " " .	75
369.	7 × 10 "	10 × 10 " 24 " " " .	1 25
370.	7 × 10 "	8 × 8 " 24 " " " .	1 25

Of Ruled Cross Section Paper.

No. 371.	8 × 10 in.,	10 × 10 to one inch, ruled in blue, 24 sheets, Each,	$0 50
372.	8 × 10 "	8 × 8 " " 24 " "	50

SOLID SKETCH BLOCKS—PLAIN.

	Sizes,	5x7	7x10	9x12	10x14	14x20 in.
No. 373.	Standard Paper, Per doz.,	$2 40	$4 20	$ 5 60	$ 7 00	$12 20
374.	Whatman's " "	5 00	9 00	12 50	17 40	31 50

SOLID SKETCH BLOCKS—BOUND.

Leather Back and Corners, Cloth Sides, Pencil Loop.

	Sizes,	5x7	7x10	9x12	10x14	14x20 in.
No. 375.	Standard Paper, Per doz.,	$ 8 00	$11 00	$14 25	$16 50	$28 00
376.	Whatman's " "	10 00	15 90	21 50	26 00	46 75

PORTFOLIOS

No. 377.

No. 377. Paper Sides, Cloth Back and Corners.

	Sizes,	12x16	14x18	17x22	20x26	23x31 in.
	Per doz, ...	$6 30	$7 80	$10 50	$14 40	$19 20

378. Cloth Sides, Leather Back and Corners.

	Sizes,	12x16	14x18	17x22	20x26	23x31 in.
	Per doz., ...	$13 00	$14 50	$18 00	$24 00	$33 00

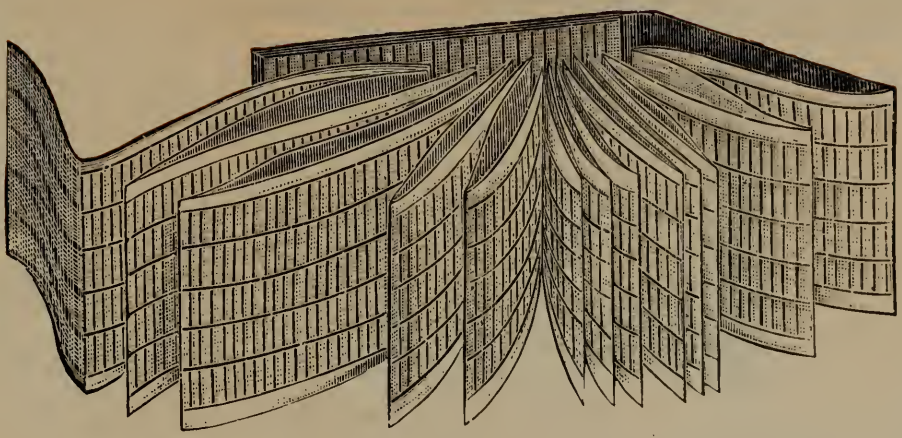
DUNHAM'S PLAT AND PROFILE BOOKS.

These books are of thin, strong paper, bound in flexible morocco, $4\frac{1}{4} \times 9\frac{1}{2}$ inches. They contain 28 profile pages, plate B, engraving $3\frac{1}{4} \times 7\frac{1}{2}$ inches, printed in green, and have a blank page with margin opposite each profile page, for plats, etc. Some valuable tables are also given in these books.

No. 379. Dunham's Plat and Profile Books, ... Each, $1 00

PROFILE BOOKS

CONTINUOUS.



No. 382.

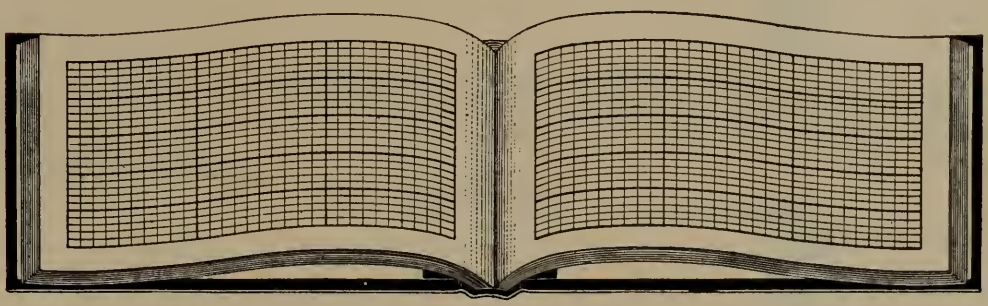
Bound in Flexible Morocco Covers.

These books are folded like a map to replace the continuous rolls of profile paper, and the pages are mounted on muslin.

Each leaf, or two pages facing, contain six thousand feet—a "Section" as generally laid out for the construction of a road. The paper lays smooth and is of extra fine quality.

No. 380.	Plate A.	4 × 20 to one inch.	$5\frac{1}{2}$ × 8 inches.	Printed in green.		
		12	25	50	100	miles.
		Each, $2 00	3 20	5 20	9 40	
No. 382.	Plate B.	4 × 30 to one inch.	$4\frac{3}{4}$ × 8 inches.	Printed in green.		
		12	25	50	100	miles.
		Each, $2 00	3 20	5 20	9 40	

NOT CONTINUOUS.



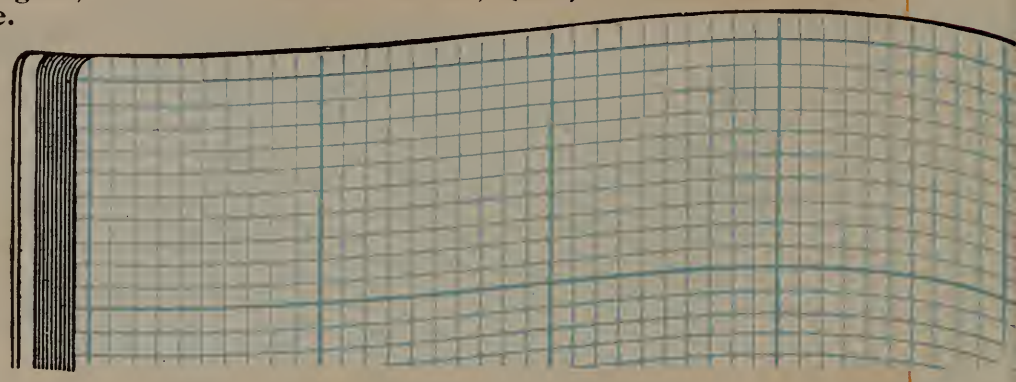
No. 387.

Stiff Morocco Covers.

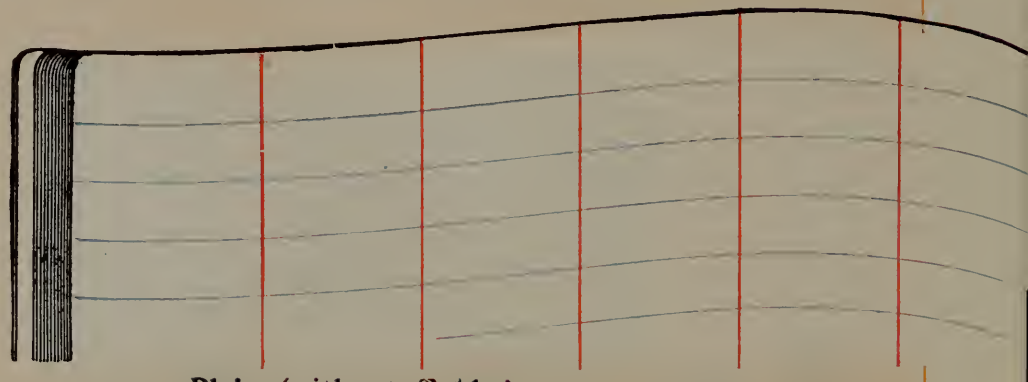
No. 385.	Plate A.	4 × 20 to one inch.	Size of book, 7 × 10 inches.	Printed		
	in green.		25	50	100	leaves.
	Bound in Morocco, . .		Each, $1 75	2 25	3 00	
No. 387.	Plate B.	4 × 30 to one inch.	Size of book, $5\frac{1}{2}$ × $9\frac{1}{2}$ inches.	Printed		
	in green.		25	50	100	leaves.
	Bound in Morocco, . .		Each, $1 75	2 25	3 00	

ENGINEERS'

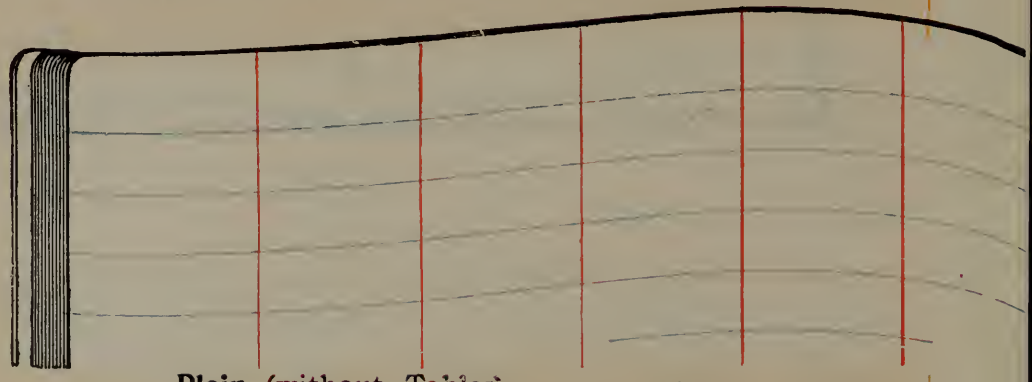
The Field and Cross Section Books manufactured by us are bound in sheepskin, style or size of Engineers' Field and Cross Section Books made to order in lots
The Tables in our Field Books were calculated by F. E. Paradis, C. E., and con-
decimals of a degree; Inches in decimals of a foot; Radii, Ordinates and Deflec-
Curve Formulæ.



	Plain (without Tables).	Each.	Dozen.
No. 389.	Cross Section Book, 4½ × 7½ in., 80 leaves, ruled 10×10 to 1 in.,	$0 50	$5 40
390.	Cross Section Book, 5½ × 7½ in., 80 leaves, ruled 10×10 to 1 in.,	65	6 60
391.	Cross Section Book, 6½ × 8½ in., 80 leaves, ruled 10×10 to 1 in.,	85	9 00



	Plain (without Tables).	Each.	Dozen.
No. 400.	Field Book, 4½×7½ in., 80 leaves,	$0 50	$5 40
401.	" " 4¼×7 " 60 "	45	4 50



	Plain (without Tables).	Each.	Dozen.
No. 403.	Field Book, 4½×7½ in., 80 leaves,	$0 50	$5 40
404.	" " 4¼×7 " 60 "	45	4 50

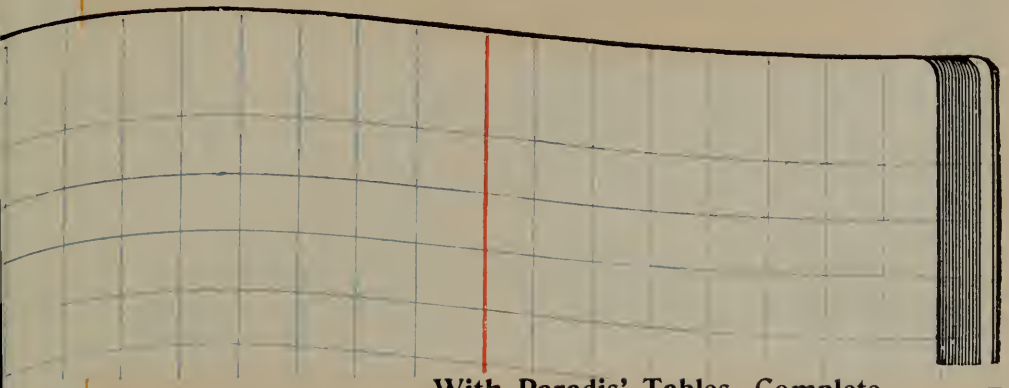
FIELD BOOKS

with round corners and round back so as to lie flat when open. Any other of not less than six dozen of a kind.

sist of the following: Tables for Excavations and Embankments; Minutes in tions; Tangents and Externals to a 1° curve; Middle Ordinates for Rails, and

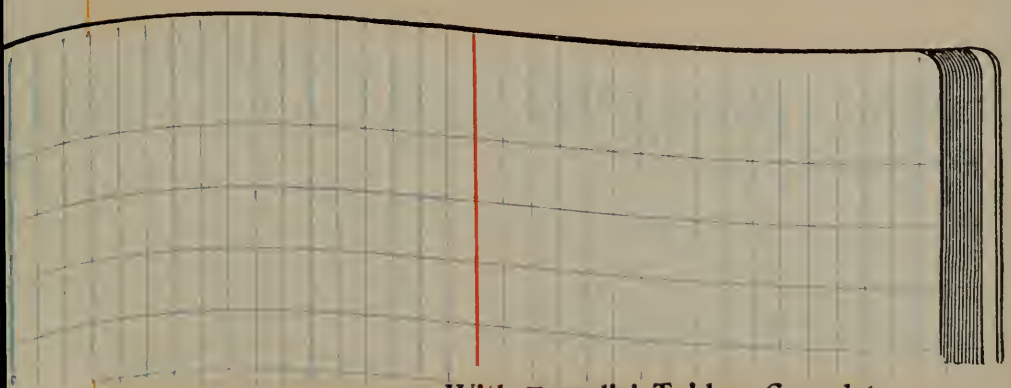
With Paradis' Tables for Excavations and Embankments.

		Each.	Dozen.
No. 389T.	Cross Section Book, like No. 389, but with Tables,	$0 60	$6 00
390T.	" " " " " 390, " " "	70	7 20
391T.	" " " " " 391, " " "	90	9 50



With Paradis' Tables, Complete.

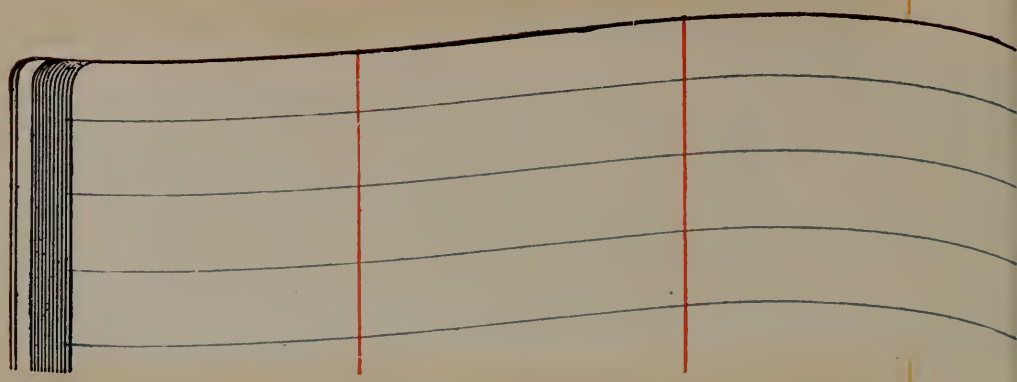
		Each.	Dozen.
No. 400T.	Field Book, like No. 400, but with Tables, .	$0 60	$6 00
401T.	" " " " 401, " " " . .	50	5 00



With Paradis' Tables, Complete.

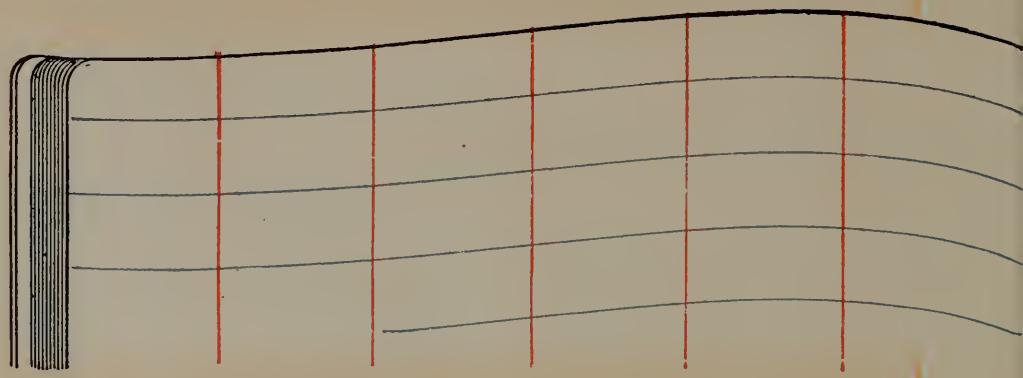
		Each.	Dozen.
No. 403T.	Field Book, like No. 403, but with Tables, . .	$0 60	$6 00
404T.	" " " " 404, " " " . .	50	5 00

ENGINEERS'



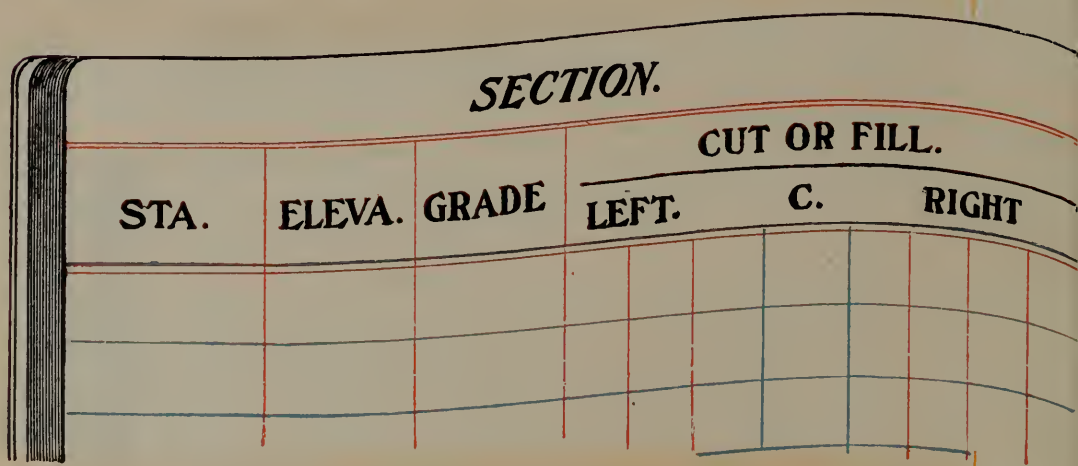
Plain (without Tables).

		Each.	Dozen.
No. 405.	Transit Book, $4\frac{1}{2}\times7\frac{1}{2}$ in., 80 leaves, ...	$0 50	$5 40
406.	" " $4\frac{1}{4}\times7$ " 60 " . .	45	4 50



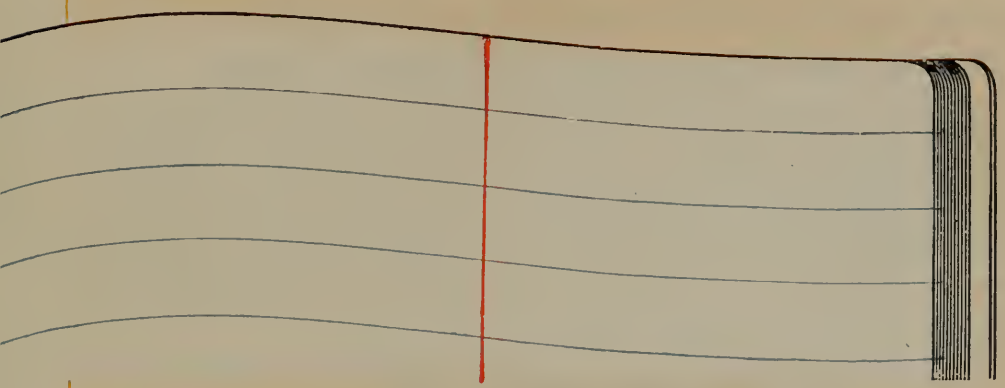
Plain (without Tables).

		Each.	Dozen.
No. 410.	Level Book, $4\frac{1}{2}\times7\frac{1}{2}$ in., 80 leaves, ...	$0 50	$5 40
411.	" " $4\frac{1}{4}\times7$ " 60 "	45	4 50



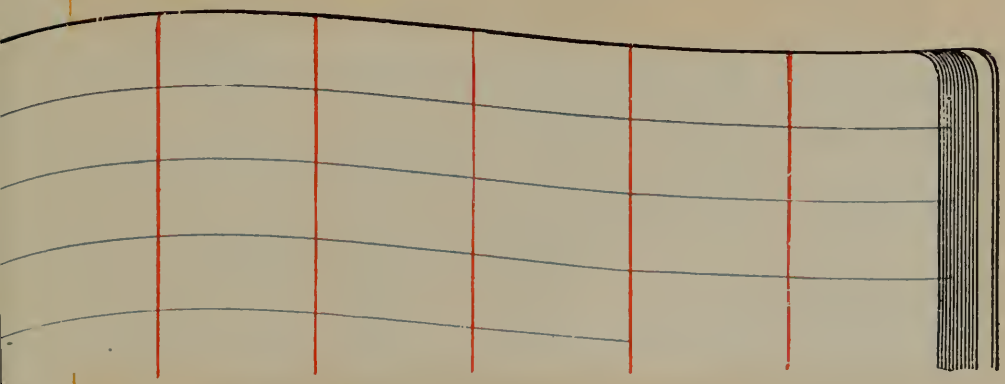
No. 420.	Field Book, $5\frac{1}{4}\times8$ in., 80 leaves, printed headings, plain (without	
420T.	" " $5\frac{1}{4}\times8$ " 80 " " "	with Paradis'

FIELD BOOKS



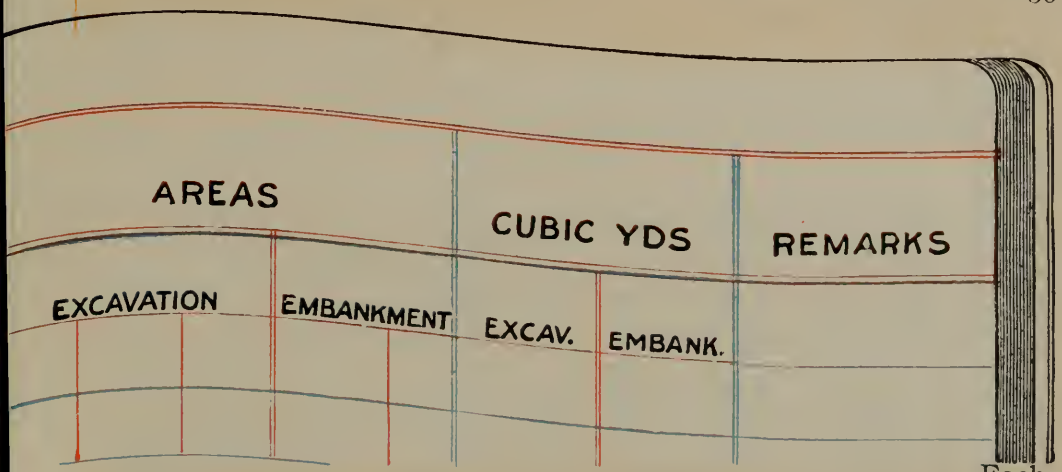
With Paradis' Tables, Complete.

		Each.	Dozen.
No. 405T.	Transit Book, like No. 405, but with Tables,	$0 60	$6 00
406T.	" " " 406, " " " .	50	5 00



With Paradis' Tables for Excavations and Embankments.

		Each.	Dozen.
No. 410T.	Level Book, like No. 410, but with Tables, . .	$0 60	$6 00
411T.	" " " " 411, " " " . .	50	5 00



	Each.	Dozen.
Tables), ...	$0 85	$8 50
Tables, complete, ...	90	9 00

"STANDARD"

BLANKS FOR THE BUILDING TRADES

BLANK FORM SPECIFICATIONS AND REMINDER.

For Frame and Brick Buildings, costing from $500 to $10,000.

We call attention to our new and revised blank forms of **Specifications and Contracts** and other forms, which have been added to our list, and especially to the revision of the Plumbers' Specification Blank, which has been entirely rewritten, and the addition of the Heating and Electric Wiring Specification Blanks which the present requirements demand in the up-to-date building. A thorough revision of the other blank forms of the Specifications, Contracts, Bonds, etc., has been made, so as to meet the requirements of the advanced ideas of the building laws and the new revised State lien laws.

THE "STANDARD" BLANK FORMS OF SPECIFICATIONS consist of 17 different specifications, furnished on 14 sheets. In strong manilla cover, containing the following blank forms:

PREAMBLE,	PLUMBERS',	IRON (Structural),	AGREEMENT between Owner and Contractor (with Bond).
MASONS', CUT STONE,	PAINTERS', GLAZIERS',	HEATING, Steam or Hot Water,	
PLASTERERS', CARPENTERS',	GASFITTERS' SEWERS, GALVANIZED IRON.	HEATING, Furnace, ELECTRIC WIRING,	CONTRACTORS' STATEMENT.

Besides the above mentioned forms, attention is called to the useful **"Architects' Reminder"** printed on inside of cover.

No. 430. **"Standard" Specifications.**
Single sets, . $0 25; Dozen sets, $2 50; 100 sets, $17 50

433. **Printed Covers** for specifications, plain, ... Per doz., 25; Per 100, 1 75

436. **Building Contracts,** . . . " 20; " 1 25

436½. **Building Contracts,** with bond, " 25; " 1 75

437S. **"Uniform" Building Contracts,** singular, Per doz., 25; " 1 75

437P. **"Uniform" Building Contracts,** plural, " 25; " 1 75

438A. **Contractors' Statements,** . . . . " 25; " 1 75

438B. **Mechanics' Lien Notice,** . . . . " 25; " 1 75

438C. **Waiver of Lien,** . . . . . " 25; " 1 75

440. **Architects' Certificate Books.** Cloth bound. Per book of 100 blanks on good quality bond paper, ... Each, 60

441. **Architects' Certificate Books.** 100 blanks. Ordinary paper, ... " 40

TYPEWRITER PAPERS FOR SPECIFICATIONS, ETC.

No. 460. **Onion Skin Bond,** white, 8½x13 in., per ream of 500 sheets, in box, $1 75

462. **Standard Bond,** thin, 8½x13 in., per ream of 500 sheets, in box, 1 45

464. **Standard Bond,** medium, 8½x13 in., per ream of 500 sheets, in box, 1 70

SUNDRIES

No. 470. **Black Oil Cloth,** for covers for drawings, 48 in. wide. Per yard, $0 40

471. **Green Oil Cloth,** " " " " 48 " " " 40

475. **Legal Cap Paper,** Per quire, $0 30; Per ½ ream, $2 25; Per ream, 4 00

480. **Gelatine or Glass Paper,** in sheets 15¾×23⅝ in., medium thick, ... Per sheet, 25

DRAWING INSTRUMENTS

Owing to the fact that many prospective purchasers of Drawing Instruments are located outside of the large cities and are therefore unable to personally inspect the instruments they may need, we deem it expedient to explain the differences in our various grades, so that any of our patrons (and we hope to include all members of the engineering and drafting professions in that category) may intelligently select such instruments as may best suit their purpose.

We handle five different grades of Drawing Instruments, but as most engineers and draftsmen are interested only in the highest grade—realizing that in the long run first grade tools are really cheaper than lower priced ones—we shall pay special attention to our highest grade instruments and shall try to point out the particular merits of each line.

HIGHEST GRADE INSTRUMENTS.

To suit all tastes, we offer to the American public in addition to our well known **"Gem Union"** brand, the **"Richter" Instruments of Precision,** which are sold only by us or dealers handling our goods, in the United States, Canada and Mexico.

The remarkable success the Richter Instruments have met with in the short time they have been introduced has proved very gratifying to us, and the numerous testimonials we have received show us that the instruments' many unique features are receiving as prompt recognition from American draftsmen as they did from members of the profession in Europe, where the Richter Instruments are considered the instruments "par excellence."

Our **"Gem Union" brand** is too well known to require any introduction, and the "Pivot joint Compasses with the bolt running all the way through" is a familiar phrase to draftsmen, most of whom have heard salesmen for competing houses **try** to explain (but with indifferent success) why Compasses of similar appearance, but not possessing this feature, could be just as good.

It is difficult to establish any comparison between the **"Gem Union"** and **"Richter" Instruments,** as they differ so radically in construction, and each line possesses features absolutely unique to itself. Each may, however, be considered perfect along its own lines, and the matter of selection between them must be left to the taste of the purchaser, who cannot make a mistake in choosing either, as both bear our unqualified guarantee.

GEM UNION INSTRUMENTS

Since we first put our Gem Union brand of instruments upon the American market, we have endeavored to maintain same at the highest degree of perfection, and by embodying in their construction such points as the experience of the most skillful draftsmen of America and Europe have found valuable, we believe that the "Gem Union" instruments, as now constructed, are mechanically superior to any other brand upon the market, with the exception possibly of the "Richter" line.

Regarding excellence of material we claim no monopoly, and do not adopt the tactics of some of our competitors, who try to belittle any instrument not handled by them. On the contrary, we willingly concede the excellence of **material** of several of the high grade brands; and while the material of which our "Gem Union" instruments are constructed is as good as money and skill can produce, we lay special stress upon the **mechanical features** of the instru-

GEM UNION INSTRUMENTS *Continued*

ments—notably the **"Union Pivot Joint," "Screw Thread Needle Point," "Improved Shank and Clamp Socket," "Clamping Device"** and **"Slide-Catch Device"** for cleaning pens, each of which points will be explained in detail.

MATERIAL.

The materials employed in the manufacture of "Gem Union" instruments are German silver and steel. The German silver used is hard rolled sheet metal and not cast or coined in die; the steel is the highest grade of tool steel that can be obtained.

To test the elasticity, density and hardness of a metal, it is necessary to apply a strain until it breaks. We have done this with the German silver employed in the manufacture of our "Gem Union" instruments, as well as with that of most of the other well known brands, and we feel justified in stating that the German silver in our above named instruments has withstood, before breaking, a greater strain than the best German silver of any other make thus tested.

FINISH.

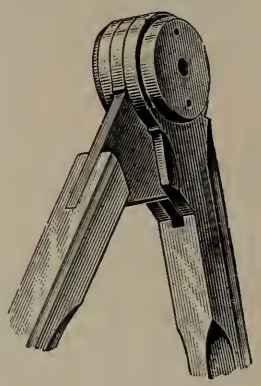
The finish of our "Gem Union" instruments is remarkably fine, and so bright that the least flaw or fault in workmanship, form or quality of material can be easily detected.

GEM UNION COMPASSES.

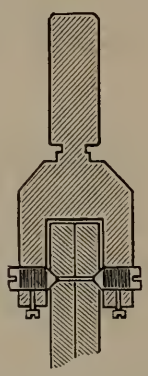
The drawing instruments most used are Compasses and Dividers (in various styles) and Ruling Pens. We shall therefore give a brief description of each.

The most important part of a pair of compasses, and the part which in poor instruments will give the most trouble, is the head, formed by the joint.

There are various styles of joints, the tongue and pivot joints being most generally used.



Tongue joint.



Ordinary Pivot joint.

Union Pivot joint.

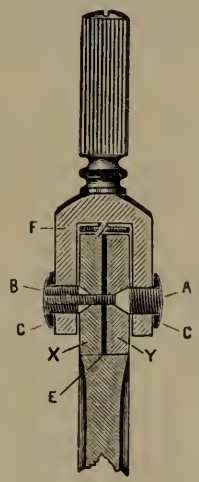
Richter Pivot joint.

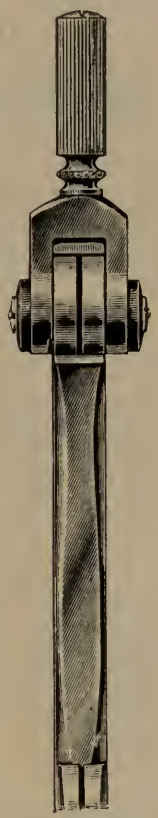
Owing to the fact that with the pivot joint any wear on the pivots can be compensated by simply tightening, while the construction of the tongue joint permits of no provision for taking up the lost motion caused by wear, the latter joint has long since been abandoned (for all but the cheaper grade of tools) by all up-to-date progressive instrument houses.

GEM UNION INSTRUMENTS *Continued*

It is therefore generally recognized that the pivot joint is much more desirable, and any defects it may possess in its ordinary form are overcome in our improved forms.

THE UNION PIVOT JOINT.





As will be noted by illustration above, the steel bolt or screw "A" passes through the entire head and fits into screw "B."

The conical-shaped parts of "A" and "B" form the pivot points which are securely held by lock nuts "C" and "C." The figure "E" indicates a steel disc that acts as an anti-friction bearing for heads of compass legs "X" and "Y."

The advantages of the "Union" joint are, as will be readily seen, of the highest importance.

1. The weight of the fork "F" is minimized, as the bolt "A-B" goes entirely through the legs and bolts the forks together, thus making the heavy and clumsy forks required by the usual style pivot joint unnecessary.

2. The danger (ever present in the usual style instrument) of spreading and possibly breaking the arms of the fork if too much tension is applied to the pivots, is entirely eliminated by the screw bolt "A-B."

3. Adjustment can be rapidly made, because to apply tension only **one** of the lock nuts must be loosened.

4. The large bearing surfaces of the joint greatly increase its durability.

5. It is impossible to spring the legs of compass out of position by accidents, such as dropping, etc.

6. The construction of the joint gives the instrument a neat, clean and graceful appearance.

The **Straightening Device** "G-G," as applied to some of our Gem Union compasses and dividers, is a simple and useful attachment for holding the handle in a perpendicular position at all times, irrespective of the spread of the legs "X-Y."

GEM UNION INSTRUMENTS *Continued*

SCREW-THREAD NEEDLE POINT.

Patented Dec. 26, 1899.

The screw-thread needle point possesses the obvious advantages of quick, minute and positive adjustment.

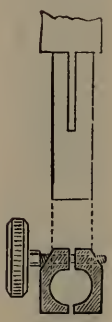
The portion "A" is threaded in the extremity of the leg.

The portion "B" is knurled to be more easily turned with the fingers.

The thumb-screw "C" clamps the needle point rigidly.

We have adopted screw-thread needle points for all our better grade instruments, bow pencils and bow pens included.

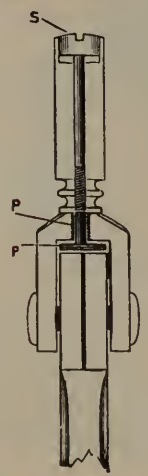
SHANK AND CLAMP SOCKET.



In the round form the feathered shanks fit into side clamping spring sockets. By this construction the interchangeable parts of the compass are locked firmly twice. First, by the steel feather of the shank, and secondly, by clamping sockets drawn together with screw.

In the pentagonal form, the shank is held in socket by means of a screw. The sharp corners of the shank may wear, in which case the pressure of the set screw is not enough to hold the shank rigid. For this reason the pentagonal shank is less satisfactory for the highest grade instruments. In our Gem Union instruments the shanks of all interchangeable parts are made in the round feathered shape.

CLAMPING DEVICE.



By a turn with key "A" the screw "S" presses down on pin "P" which is fastened to the small plate "P." This plate "P" is resting on the top of compass legs, and being pressed down upon them holds the Divider or Compass points safely in any position.

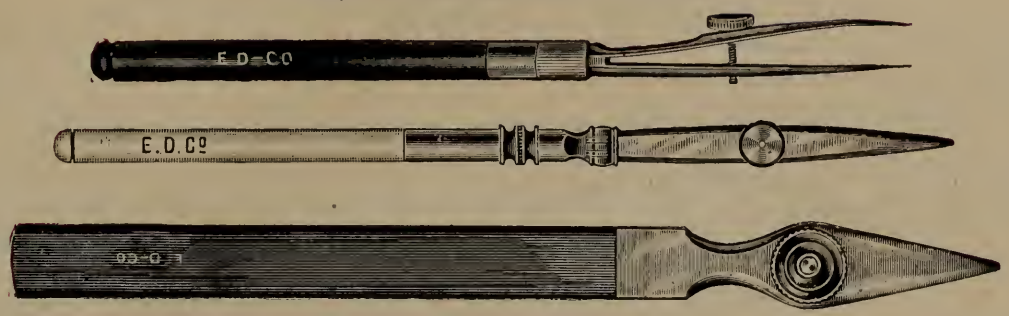
Owing to the strength given to our Union joint by the steel bolt connecting the pivots, no harm can be done to the joint by the clamping device such as is likely to happen with any other pivot joint.

The further advantage of our clamping device over others in the market is that the handle remains perfectly rigid and that there is no screw on top or other impediment to the free and safe handling of the instrument.

The device is very valuable for spacing the same distances or for using the same opening of compasses repeatedly and accurately.

GEM UNION INSTRUMENTS *Continued*

GEM UNION RULING PENS.



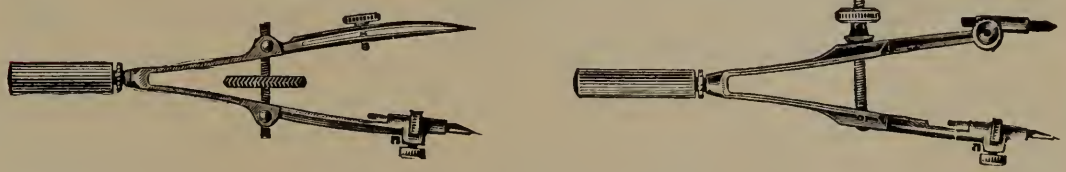
The Ruling Pen is, if not the most important instrument, at least the one which is in most constant use, and we therefore spare no efforts to make our pens as nearly perfect as possible. The tool steel used is tempered to a degree of hardness which allows pens to hold their points for a long time, and the pens being properly sharpened, perfect alignment of the nibs against the paper is assured.

The pen without joint is now most generally used, and as most draftsmen are somewhat careless about cleaning their pens frequently, we have placed upon the market our "Improved Slide-Catch Pen" described and listed under Nos. 510-512. This pen can be cleaned or sharpened without changing the adjustment for width of lines.

Few draftsmen appreciate the importance of thoroughly cleaning their pens before laying them aside. Most drawing inks corrode steel and a fine pen may be quickly ruined by carelessness in this respect. The "Slide-Catch Pen" is therefore especially valuable, as the cleaning operation can be performed with a minimum of trouble.

We also apply the slide-catch cleaning device to pen parts of the "Gem Union" compasses, Nos. 631P. and 632P.

GEM UNION BOW INSTRUMENTS.



Steel Spring Bow Instruments, which are largely used in conjunction with the ordinary compasses and dividers, have become very popular in recent years. We can furnish same in four different sizes. The instruments are made of one continuous piece of steel carefully tempered and finished. The screws and handles are of German silver. All screw threads are made with especial care. All Bow Pencils and Bow Pens are fitted with our patent screw-thread needle points.

GUARANTEE.

Each Gem Union Instrument is guaranteed to satisfactorily perform the work for which it is intended and to be absolutely perfect in every respect.

RICHTER INSTRUMENTS OF PRECISION

Sold only by us or dealers handling our goods.

The **"Richter"** instruments, although on the American market but a short time, are rapidly gaining the high position to which their excellence of material and workmanship, as well as their many desirable and unique features, entitles them.

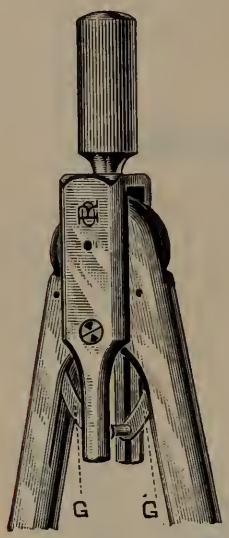
Some of the innovations in style may at first glance seem startling to the American eye, but when same are examined point by point, each feature will be found to be admirably adapted to the purpose for which it was devised, and the simplicity and effectiveness of the various points will win the user's admiration, and most likely gain a staunch friend for the "Richter" instruments.

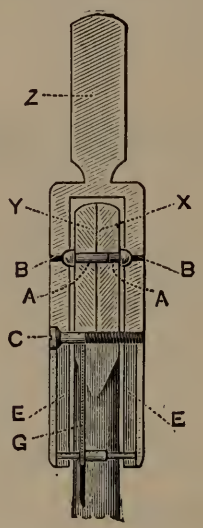
RICHTER COMPASSES AND DIVIDERS

The most important requirement in Compasses and Dividers intended for high class work is an absolutely true and steady joint, and no matter how excellent the material and workmanship of the Instrument may be, it is useless unless the joint is mechanically perfect.

The "Richter" joint fulfills these conditions, and its mechanical working is perfect. It can never become loose or work imperfectly; it permits of easy, rapid and exact adjustment, and can readily be oiled if desired.

THE RICHTER JOINT.





As will be noted by illustrations above, the joint is constructed by two concentric pivots, "A–A," having an oval head at each end; these heads rest in the recesses "B–B" drilled on the inner surface of the fork "E–E" to receive the pivots. The adjustment of the joint is simply and effectively regulated by the screw "C," which can be tightened or loosened at will, and by means of which any wear in the joint can be effectually compensated.

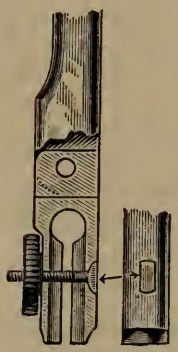
It will thus be seen that the tension can be **readily and minutely regulated,** and that even and uniform action of the joint is not dependent on the transient elasticity of the fork, but is assured by the permanent pressure exerted by screw "C." The principles employed in the construction of the joint insure smooth motion during the entire life of the instrument.

The **"Straightening Device,"** "G–G," a feature by means of which the handle "Z" is always held perpendicular to the drawing surface, irrespective of the spread of the legs, "X–Y," is an especially valuable attachment to the Richter Compasses and Dividers, and will be appreciated by all who use Drawing Instruments. The simplicity of this feature will be noted by reference to the illustrations.

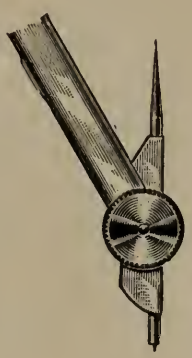
RICHTER INSTRUMENTS OF PRECISION *Continued*

GENERAL FORM.

The legs of all Compasses and Dividers are shaped as shown in cross sectional cut herewith, and have **no sharp edges or corners.** The Richter Instruments are therefore more pleasant to handle than those of the usual style. The unique form, coupled with the easy motion of the joint, enables users to easily spread the legs and make minute and accurate adjustments with one hand. There are no side screws to bother the user or interfere with the vision.

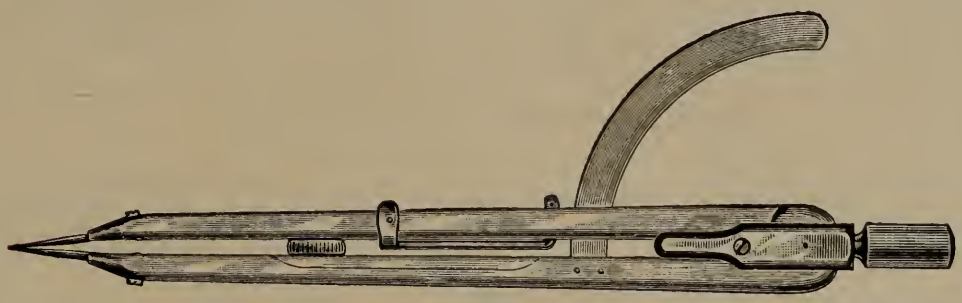


Pen, pencil and needle parts are securely held in their sockets by clamps of the **"T Bolt" pattern.** The principle of the socket is very simple, but effective, and as all spindles and nuts are interchangeable, parts can be interchanged, or lost parts can be replaced without trouble and but little or no expense. The possibility of stripping threads is thus almost entirely eliminated and a tight joint is insured.



The "fixed needle point leg" is provided with needle point held in a **reversible sleeve,** so that either a plain or shoulder point can be used and the sleeve can be turned to a perpendicular position, even when the legs are opened to their gr atest extent. It is thus possible, as the sleeve is at end of leg, to conveniently use the instrument on **greater radii than are possible with any other style.**

All Compasses have an **extra needle point leg,** so that they can be used as dividers, and the needle for same is **adjustable and reversible.** In case of damage to both points, only a new needle point is required.



The **Self Clamping Compasses and Dividers** will be found valuable for fine work of any description, but especially when the same opening (adjustment) of legs is used a number of times. The legs are automatically held absolutely rigid at any point, and to change the adjustment it is merely necessary to press on a small spring on the outside of compass legs, when the pressure is released and the legs move as freely as those of the plain compasses.

The **steel points** on all Dividers are **adjustable and reversible,** and in case of damage to both points, a new point can be quickly substituted without trouble.

All sets contain at least one **Metal Handle** holding **reserve needle points.**

This Handle fits the pen, pencil and needle parts, any one of which can, in connection with the handle, be used as a separate instrument.

All Parts of Richter Instruments are interchangeable.

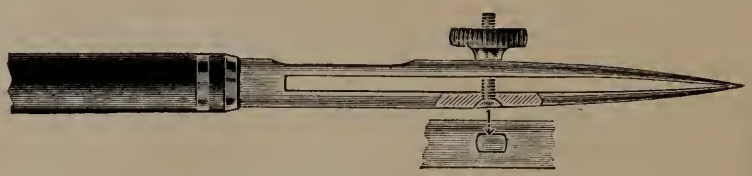
RICHTER INSTRUMENTS OF PRECISION *Continued*

The **Center Tack** which is furnished with each set is of advantage when concentric circles are drawn, as the enlarging of the center hole in paper is overcome. The center tack has a very fine point, and the top of tack is hollowed to receive point of instrument.

We call special attention to the fine (sharp) points of needles. This is especially valuable for accurate spacing, and at the same time possesses the advantage of not marking the drawing with large holes.

RICHTER RULING PENS.

All Pens are made extremely hard, and hold their points under hard usage extraordinarily well. Pens Nos. 725, 726 and 727 are made solid, and



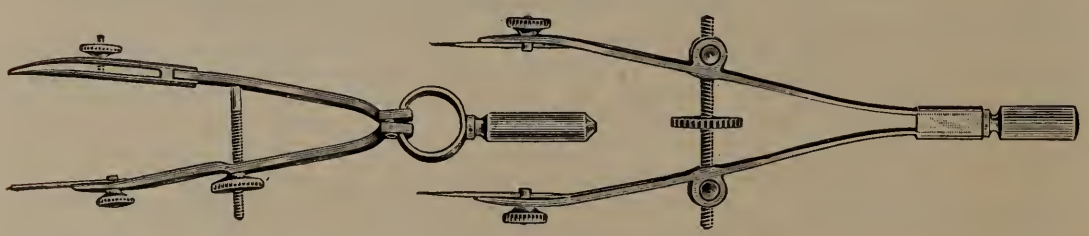
owing to the **"T Bolt"** construction any possibility of lateral motion of the blades is entirely overcome, the pressure of the screw being direct and positive.

Ruling Pens Nos. 728, 729 and 730, are of the **"Cross Joint" pattern,** and the advantage of the design (which permits of the opening of pen for cleaning or sharpening without destroying the adjustment for width of line) will be greatly appreciated by draftsmen. This feature has also been applied to pen parts of compasses.

The other styles of Richter pens we catalogue are all made as carefully as those mentioned above, and of the same high grade of material. The designs will be found unique and useful.

RICHTER BOW INSTRUMENTS.

These tools are very popular for smaller circles, and the large size Richter Bow Instruments have such a great spread that they can frequently be used in place of regular size compasses. We carry both the **"side wheel"** and



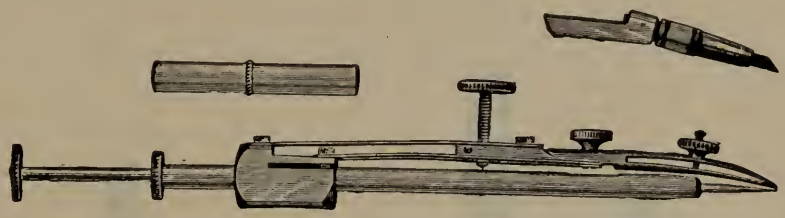
"center wheel" styles and a choice between the two styles depends upon individual taste. The two styles are made in the **ordinary spring** construction, and the **circular spring** construction.

The ordinary spring construction instruments are, with the exception of handles and screws, made of steel, while in the circular spring construction only the circular spring is made of steel. The latter style of construction possesses some advantages owing to the **absolutely even tension at any adjustment.**

RICHTER INSTRUMENTS OF PRECISION *Continued*

In all "center wheel" Bows the center screws are milled to a millimeter graduation, and can be used for millimeter spacing. The needle points on all bow instruments are **adjustable and reversible,** and can be quickly replaced in case of damage.

We call special attention to the Richter Drop Spring Bow Pen Nos. 760 and 761.



Owing to the construction of this Instrument, the pen or pencil point is always perpendicular to the drawing paper **at any adjustment,** while other drop spring bows are perpendicular **at only one point.** The improved construction also gives it greater rigidity than similar instruments possess, and the increased weight applied at the proper point makes its use much easier than that of similar instruments. The circles drawn are all clean-cut and clear, ovals and shaded circles being entirely done away with.

GUARANTEE.

Each Richter Instrument is guaranteed to satisfactorily perform the work for which it is intended, and to be absolutely perfect in every respect.

OTHER GRADES OF INSTRUMENTS

Our **"PREMIER" INSTRUMENTS** are carefully constructed of excellent material and superbly finished. They rank next in quality to the "Gem Union" and "Richter" grade and will be found superior in many respects to others offered as finest grade and highest quality. Compasses and Bow Instruments are fitted with our patent screw-thread needle points.

Our "**SUPERIOR GERMAN" INSTRUMENTS** are among the best instruments made in Germany, and next in quality to the **"Premier"** grade. They are carefully constructed of good material, will compare favorably with many so-called "highest grade" instruments and should not be confounded with other instruments of similar **appearance** but of much cheaper quality. Compasses and Bow Instruments are fitted with our patent screw-thread needle points.

The **"FINE GERMAN" INSTRUMENTS** listed in this catalogue are of substantial quality and considerably improved in quality, shape and appearance. All dividers and compasses have handles. Compasses and Bow Instruments are fitted with our patent screw-thread needle points.

The **"UNIVERSAL" and "RELIANCE" INSTRUMENTS** are especially adapted for Manual Training School use. They have been improved in quality and appearance and will render reasonable service for a number of years. All dividers and compasses have handles.

The **NICKEL-PLATED INSTRUMENTS** recommend themselves only on account of their price. They cannot be used for professional purposes.

All our instruments are on sale by the leading dealers in most large cities of the United States, Canada, Mexico, and Cuba, or can be procured direct from us.

GEM UNION INSTRUMENTS

The Highest Grade of Instruments.

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

For description, see pages 47-51.

Illustrations ⅔ size.

No. 500. 501. 502. 506. 507. 508.

No. 500.	Ruling Pen, 4¼ in., ebony handle, ...	Each,	$0 90
501.	" " 5 " " "	"	1 00
502.	" " 5½ " " "	"	1 20
506.	" " 4¼ " " " upper blade with spring,	"	1 10
507.	" " 5 " " " " " " "	"	1 20
508.	" " 5½ " " " " " " "	"	1 35

If desired we furnish aluminum handles in place of ebony handles for Nos. 506 to 508, at 15 cents each additional.

Pens carefully dressed and sharpened, 20 to 25 cents.

GEM UNION INSTRUMENTS

Highest Grade

THE SLIDE-CATCH RULING PEN.

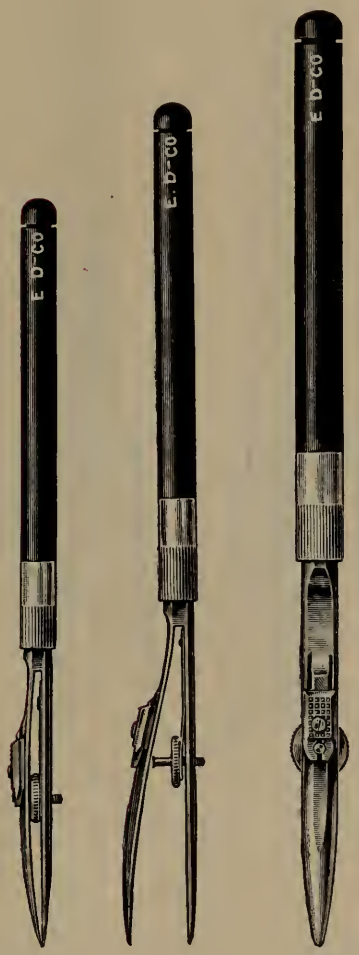
Patented April 17, 1900.

Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.

This Ruling Pen is so constructed that by the simple operation of moving a slide the blades may be instantly thrown open, cleaned or sharpened, and closed again to their former position without interfering with the set screw, thus preserving the adjustment for width of lines.

The Pen is made of one piece of finely tempered steel, with the upper blade in the form of a spring, so constructed that its elasticity tends to raise it from the lower blade a distance sufficient to permit of thorough cleaning. The Slide-Catch on the upper blade engages the slot-head of spindle, which latter also constitutes a center wheel adjusting screw, the lower end consisting of a screw working through a threaded aperture in the lower blade. By moving the slide towards the handle the blades are thrown open for cleaning or sharpening, and by pressing the blades together and returning slide to its previous position the Pen assumes its original adjustment.



No. 510. 511. 512.

A spring attached to lower blade, and bearing against the center wheel set screw, prevents the accidental rotation of latter while blades are open for cleaning.

Advantages over all other Ruling Pens.

1.—Simplicity of mechanical construction.

2.—Slide-catch, as well as the adjusting screw, can be operated with the one hand holding pen.

3.—No interference with adjusting screw in cleaning or sharpening.

4.—Large center wheel set screw allows of quick adjustment of blades.

5.—No hinge or lever to work loose.

6.—Durability of Pen.

No. 510.	Slide-Catch Ruling Pen, 4¼ in., ebony handle, . .	Each, $1 95
511.	" " " " 5 " " " . .	" 2 10
512.	" " " " 5½ " " " . .	" 2 25

Above Pens furnished with aluminum handle, if preferred, at same prices.

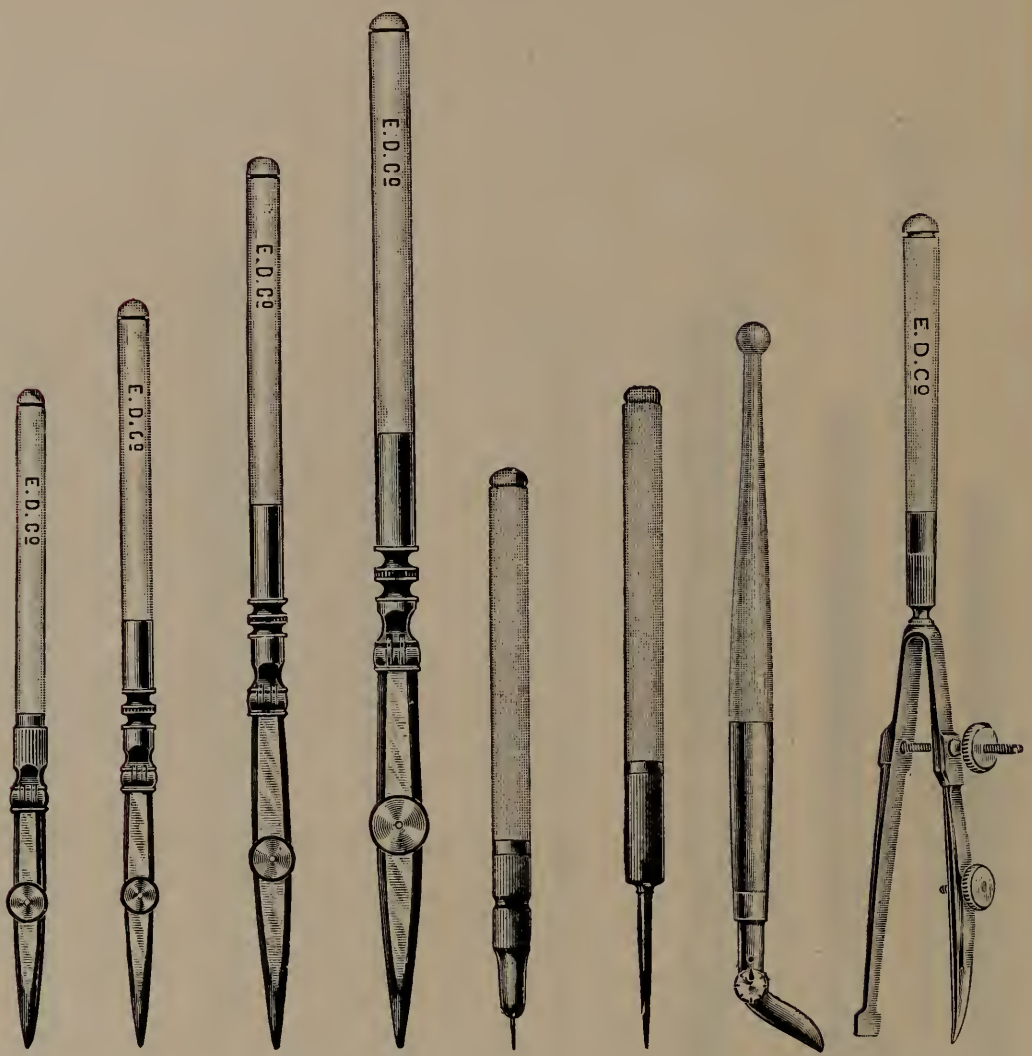
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.



No. 518. 519. 520. 521. 527. 529. 530 530A

No. 518.	Ruling Pen, 4 in., ivory handle, with joint, . . .	Each,	$1 35
519.	" " $4\frac{3}{4}$ " " " " pin and joint,	"	1 50
520.	" " $5\frac{1}{2}$ " " " " " "	"	1 80
521.	" " $6\frac{1}{2}$ " " " " " "	"	1 95
522.	" " $5\frac{1}{2}$ " " " " " "		
	with German silver blades for colored inks,	"	1 80
527.	Pricker, ivory handle, ...	"	1 65
529.	Tracer, ivory handle, ...	"	1 00
530.	Curve Pen, 5 in., ivory handle, ...	"	1 80
530A.	Spline " 5 " " "	"	3 00

If desired we furnish aluminum handles in place of ivory handles for Nos. 518 to 522, at 15 cents each additional.

Pens carefully dressed and sharpened, each 20 to 25 cents.

GEM UNION INSTRUMENTS

Highest Grade

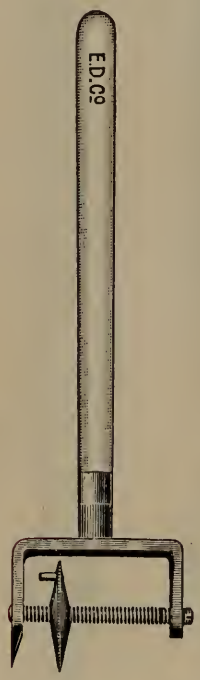
Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations ⅔ size.

No. 531.

532.



533.

534.

535.

535½.

No. 531.	Border Pen, 6½ in., improved, ivory handle, . .	Each,	$3 80
532.	Railroad " 5 " " " " . .	"	4 20
533.	Opisometer, ivory handle, for measuring curved lines,	"	1 80
534.	Dotting Pen, 6 in., ivory handle, 6 wheels, with ink reservoir, improved, ...	"	4 25
535.	Superior Dotting Pen, 4¾ in., with 5 wheels, so arranged that different settings are obtained by simply turning the thumbscrew, ...	"	6 50
535½.	Knight Dotting Pen, 4¾ in., with 4 wheels, ...	"	5 00

GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.
Each Instrument stamped E. D. Co. or Union.
Illustrations ⅔ size.

No. 536. 537. 538. 543. 544. 545.

No. 536.	Swedish Detail Ruling Pen, 5 in., ebony handle, for long lines,	Each,	$1 50
537.	Swedish Detail Ruling Pen, 6 in., ebony handle, for long lines,	"	1 65
538.	Swedish Detail Ruling Pen, 7 in., ebony handle, for long lines,	"	1 80
543.	Swedish Detail Ruling Pen, 5 in., hollow metal handle,	"	1 80
544.	" " " " 6 " " " " "	"	2 10
545.	" " " " 7 " " " " "	"	2 40

Pens carefully dressed and sharpened, 20 to 25 cents.

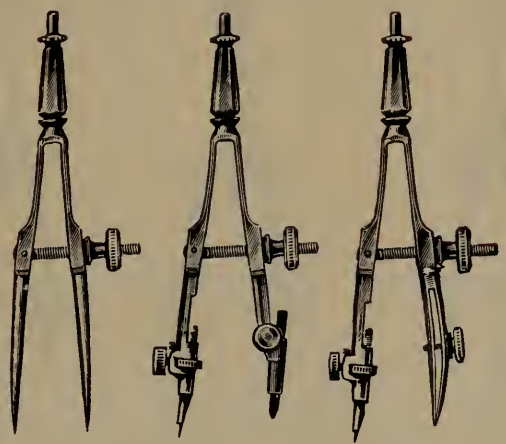
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

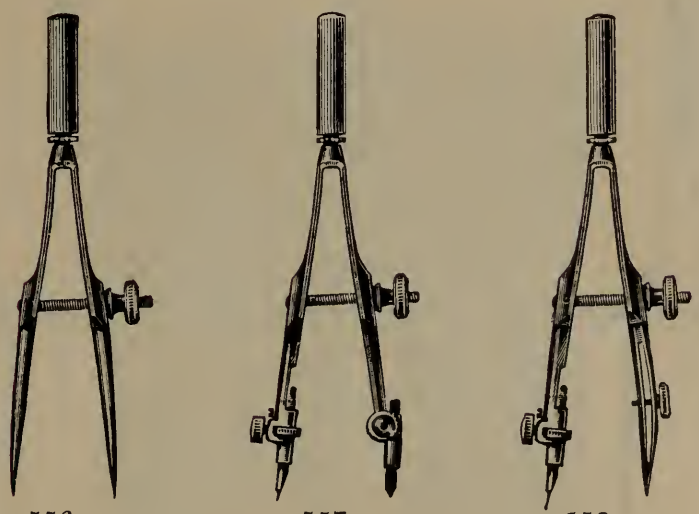
Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.



No. 550. 551. 552.

No. 550.	Minute Steel Spring Bow Dividers, $2\frac{1}{2}$ in., metal handle, Each,	$1 80
551.	" " " " Pencil, $2\frac{1}{2}$ " " " "	2 40
552.	" " " " Pen, $2\frac{1}{2}$ " " " "	2 40
553.	Set of Bows, Nos. 550, 551 and 552, in morocco case, silk velvet lined, ... Per set,	8 40



No. 556. 557. 558.

No. 556.	Steel Spring Bow Dividers, 3 in., metal handle, . . Each,	$1 80
557.	" " " Pencil, 3 " " " . . "	2 40
558.	" " " Pen, 3 " " " . . "	2 40
559.	Set of Bows, Nos. 556, 557 and 558, in morocco case, silk velvet lined, ... Per set,	8 40

Above Bow Pencils and Bow Pens fitted with our patent screw thread needle points. Patented Dec. 26, 1899

GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations ⅔ size.

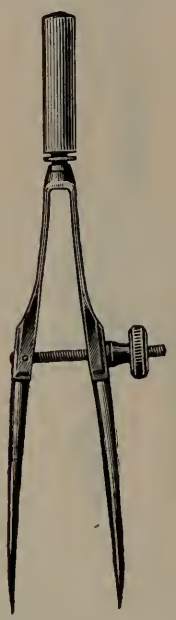
No. 560.

561.

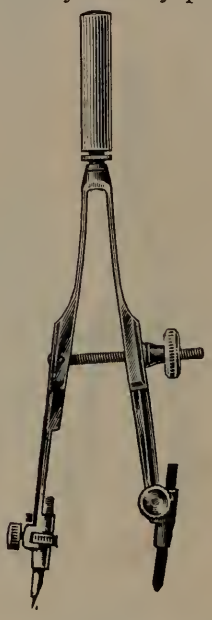
562.

No. 560.	Steel Spring Bow Dividers, 3 in., metal handle, . .	Each, $2 10
561.	" " " Pencil, 3 " " " . .	" 2 70
562.	" " " Pen, 3 " " " . .	" 2 70
563.	Set of Bows, Nos. 560, 561 and 562, in morocco case, silk velvet lined, ...	Per set, 8 70

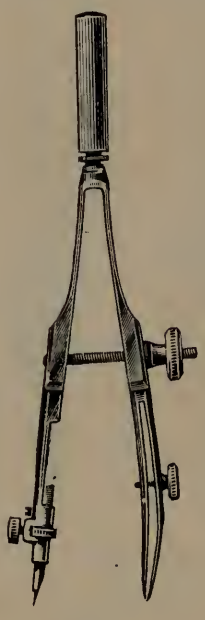
These Bows have a screw on a right and left thread, which holds the points firmly in any position.



No. 564.



565.



566.

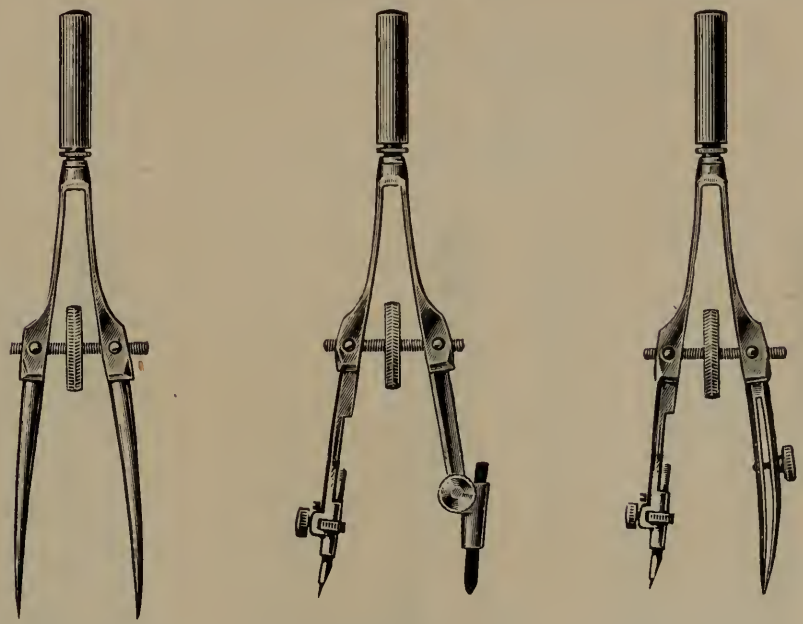
No. 564.	Steel Spring Bow Dividers, 3½ in., metal handle, . .	Each, $2 00
565.	" " " Pencil, 3½ " " " . .	" 2 50
566.	" " " Pen, 3½ " " " . .	" 2 50
567.	Set of Bows, Nos. 564, 565 and 566, in morocco case, silk velvet lined, ...	Per set, 8 20

Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.
Each Instrument stamped E. D. Co. or Union.
Illustrations ⅔ size.



No. 568. 569. 570.

No. 568.	Steel Spring Bow Dividers, 3½ in., metal handle, . .	Each,	$2 40
569.	" " " Pencil, 3½ " " " . .	"	3 00
570.	" " " Pen, 3½ " " " . .	"	3 00

No. 571.

No. 571. Set of Bow, Nos. 568, 569 and 570, in morocco case, silk velvet lined, ... Per set, $9 60

These Bows have a screw on a right and left thread, which holds the points firmly in any position.

Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

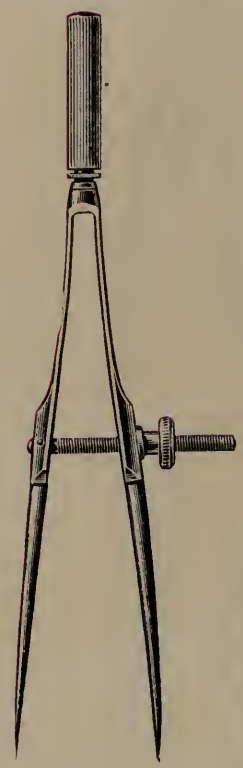
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.



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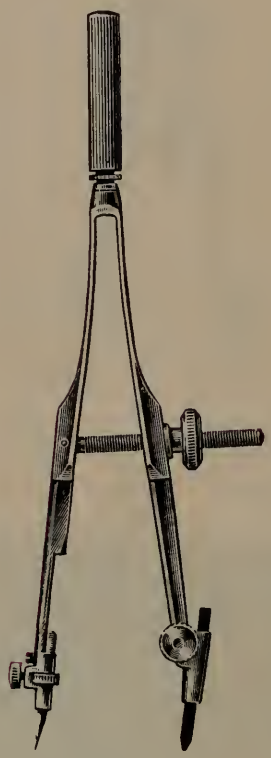
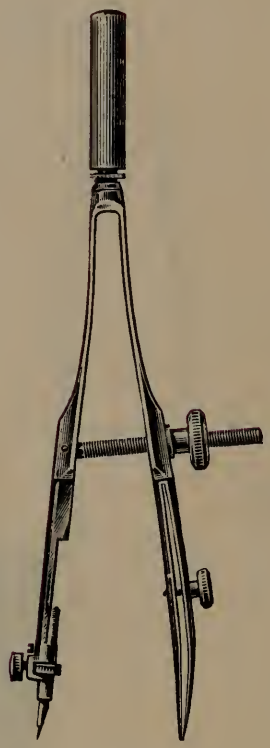


573.



574.

No. 572.	Steel Spring Bow Dividers, $4\frac{3}{4}$ in., metal handle, . . Each,	$2 40
573.	" " " Pencil, $4\frac{3}{4}$ " " " . . "	3 00
574.	" " " Pen, $4\frac{3}{4}$ " " " . . "	3 00
575.	Set of Bows, Nos. 572, 573 and 574, in morocco case, silk velvet lined, ... Per set,	9 60

Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

GEM UNION INSTRUMENTS

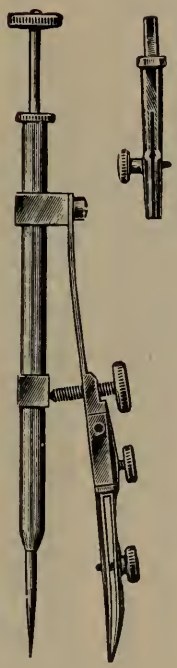
Highest Grade

Made of Rolled German Silver and Best English Steel.

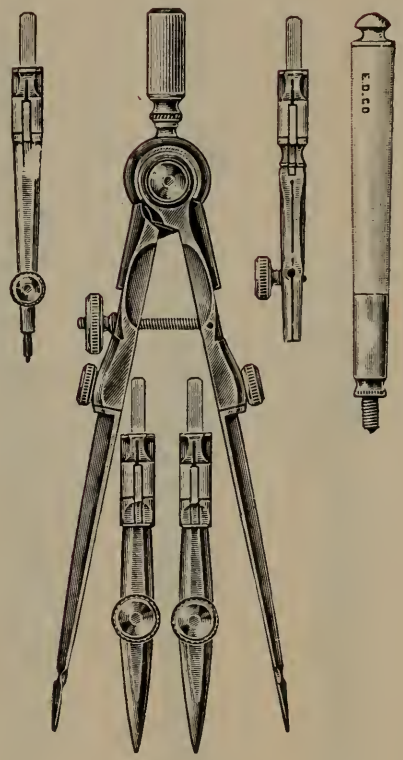
Each Instrument stamped E. D. Co. or Union.

Illustrations ⅔ size.

No. 583.



584.



588.

No. 583. Drop Spring Bow Pen, 4 in., self-adjusting, . . . Each, $3 75
584. " " " " with Pencil, 4 in., self-adjusting, " 5 00

Nos. 583 and 584 are best adapted for drawing small circles. Scratching of pen and slipping of needle point is prevented by a small center rod which remains stationary while the attachment with pen or pencil point is turned, thus drawing circles by its own weight.

No. 588. Spring Bow Compasses, with long ivory handle, 2 steel points, 2 pen points, pencil and needle point, ... Each, $8 25

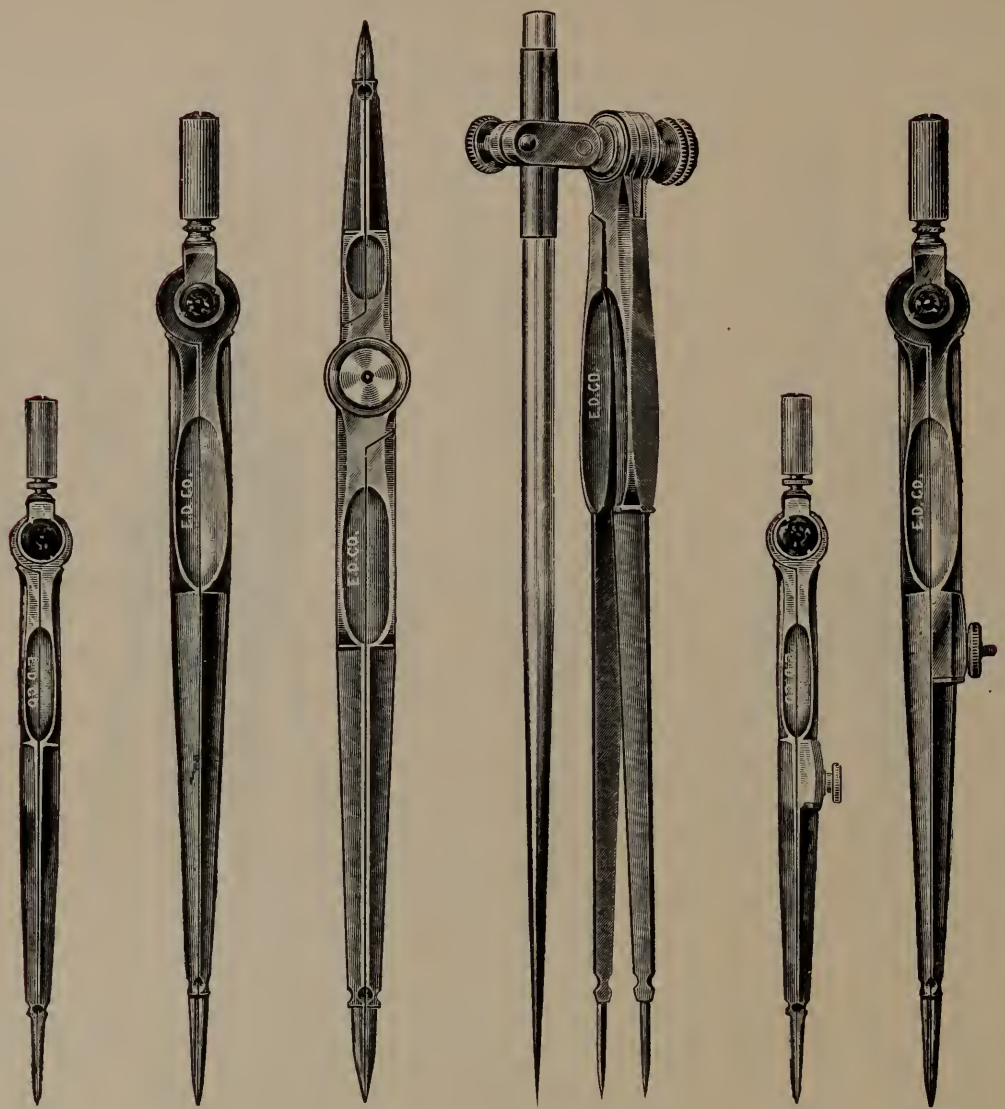
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.



No. 598. 603. 606. 608. 614. 618.

No. 598.	Plain Dividers, $4\frac{1}{4}$ in., Union pivot joint and clamp,	Each,	$2 40
599.	" " 5 " " " " "	"	2 60
603.	" " 6 " " " " "	"	2 85
606.	Whole and Half Dividers, $7\frac{1}{4}$ in.,	"	3 90
608.	Three-Legged Dividers, adjustable leg, 6 in.,	"	6 30
614.	Hairspring Dividers, $4\frac{1}{4}$ in., Union pivot joint and clamp,	"	3 15
615.	" " 5 " " " " "	"	3 40
618.	" " 6 " " " " "	"	3 60
618S.	" " 6 " with Straightening Device,	"	4 20
620.	" " 7 " Union pivot joint and clamp,	"	4 20

For description of Union pivot joint and clamp, etc., see pages 47-51.

GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Knowing the tongue-jointed instruments, with or without handle, to be inferior, less durable and less reliable than the pivot-jointed instruments, we omit to illustrate and to list them, though they bring comparatively a higher price, since it is much easier and cheaper to make a tongue joint than a pivot joint.

Illustrations ⅔ size.

No. 623. 625. 628. 629. 630.

No. 623. Compasses, 4¼ in., with fixed needle and pencil point, Union pivot joint and clamp, ... Each, $4 50

625. Compasses, 4¼ in., with fixed needle and pen point, Union pivot joint and clamp, ... Each, 4 50

628. Compasses, 4¼ in., with fixed needle point, pen and pencil point, Union pivot joint and clamp, ... Each, 6 15

629. Compasses, 4¼ in., with 2 steel points, pen, pencil and needle point, Union pivot joint and clamp, ... Each, 7 25

630. Compasses, 5 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp, . . Each, 7 25

Above Compasses fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

For description of Union pivot joint and clamp, see pages 47-51.

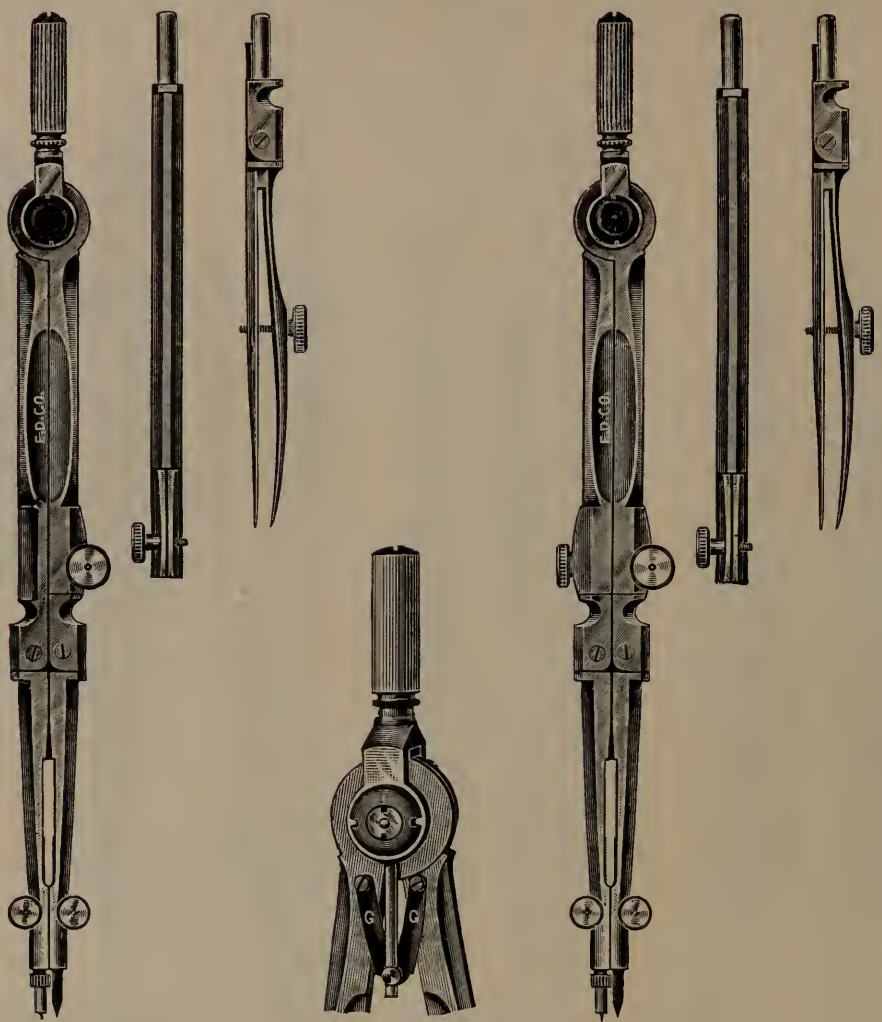
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.



No. 631. Straightening Device. 632.

No. 631.	Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp, . Each,	$7 40
631S.	Compasses, 6 in., like No. 631, but with Straightening Device, ... Each,	8 00
632.	Compasses, 6 in., hairspring, with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp, ... Each,	8 40
632S.	Compasses, 6 in., like No. 632, but with Straightening device, ... Each,	9 00

Above Compasses fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

For description of Union pivot joint and clamp, also screw-thread needle point, see pages 47-51.

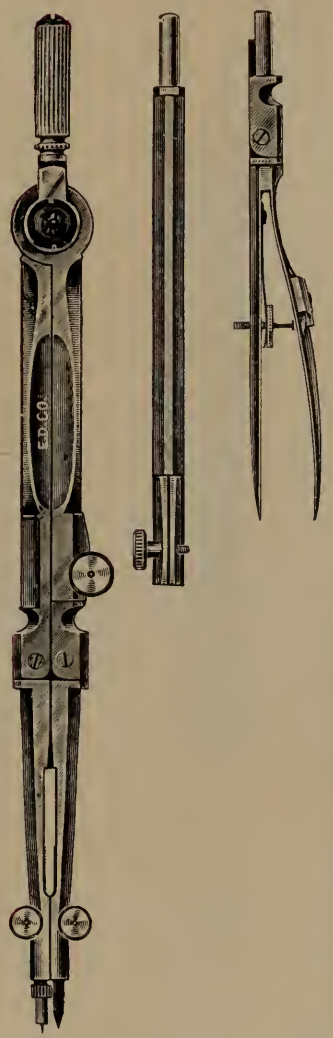
GEM UNION INSTRUMENTS

Highest Grade

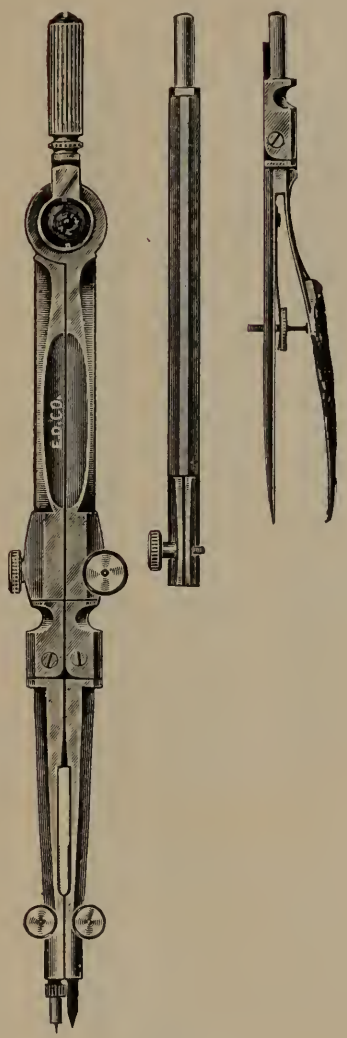
Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations ⅔ size.



No. 631P.



632P.

No. 631P. Compasses, 6 in., with fixed needle point, **patent slide-catch pen,** pencil point and lengthening bar, Union pivot joint and clamp, ... Each, $8 75

632P. Compasses, 6 in., hairspring, with fixed needle point, **patent slide-catch pen,** pencil point and lengthening bar, Union pivot joint and clamp, ... Each, 9 65

Our patent slide-catch device on above pen allows the pen to be opened for cleaning or sharpening without changing the adjustment for width of lines. Patented April 17, 1900. A full description of this form of pen will be found under Ruling Pens Nos. 510–512.

Above Compasses fitted with our patent screw-thread needle points.

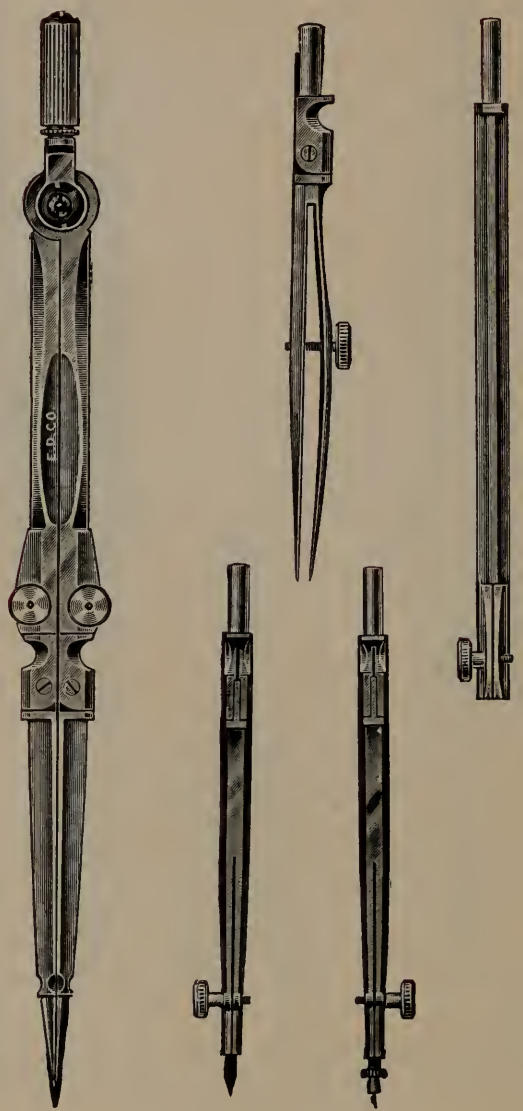
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

Illustrations $\frac{2}{3}$ size.



No. 633.

No. 633. Compasses, 7 in., with joint in each leg and with 2 steel points, pen, pencil point, lengthening bar and needle point, Union pivot joint and clamp, ... Each, $9 90

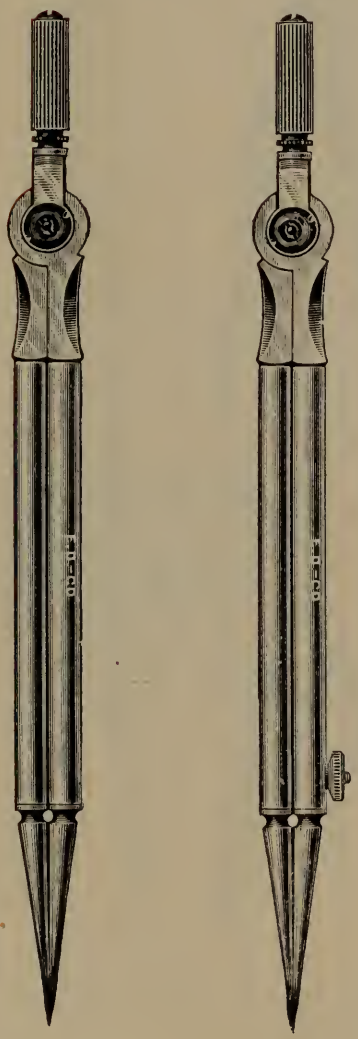
For Empty Morocco Cases and Parts of Instruments, see pages 161-162.

For description of Union pivot joint and clamp and screw thread needle point, see pages 47-51.

CYLINDRICAL GEM UNION INSTRUMENTS

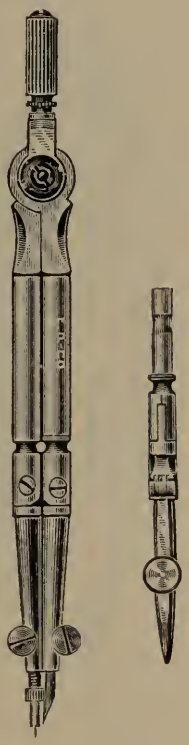
The Highest Grade of Instruments.

Made of Rolled German Silver and Best English Steel. Illustrations ⅔ size.
Each Instrument stamped E. D. Co., or Union.

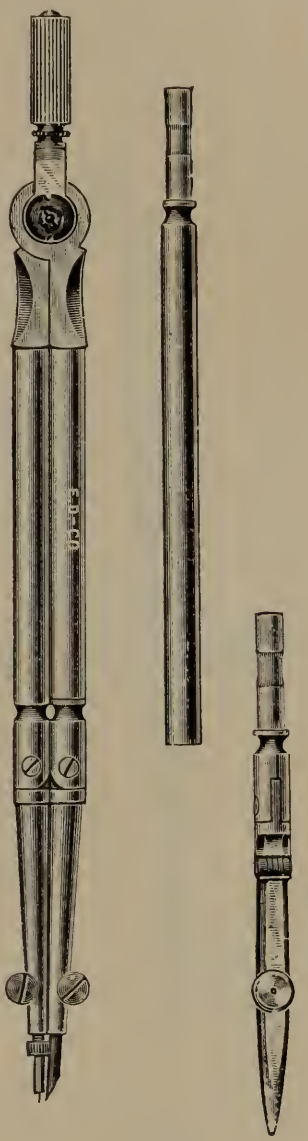


No. 635.

637.



640.



642.

No. 635.	Plain Dividers, 6 in., Union pivot joint and clamp, .	Each,	$2 70
637.	Hairspring Dividers, 6 in., Union pivot joint and clamp,	"	3 30
640.	Compasses, 4¼ in., with fixed needle point, pen and pencil point, Union pivot joint and clamp, ...	"	6 00
642.	Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp,	"	7 50

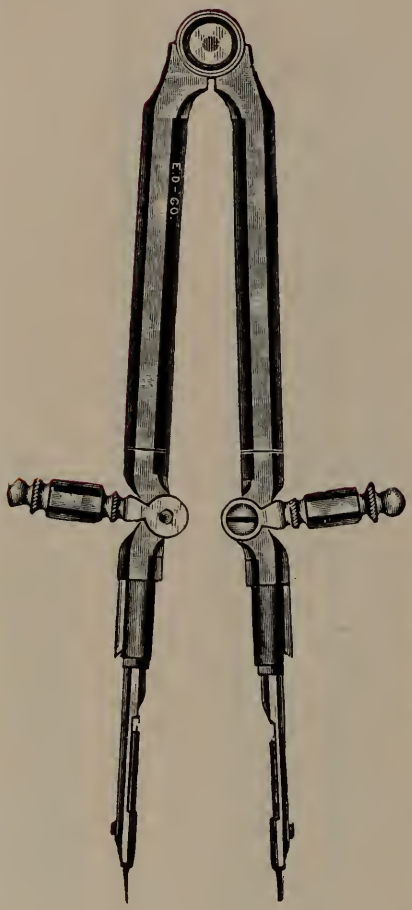
Above Compasses fitted with screw-thread needle points. Pat. Dec. 26, 1899.

For description of Union pivot joint and clamp, and screw-thread needle point, see pages 47-51.

GEM UNION INSTRUMENTS

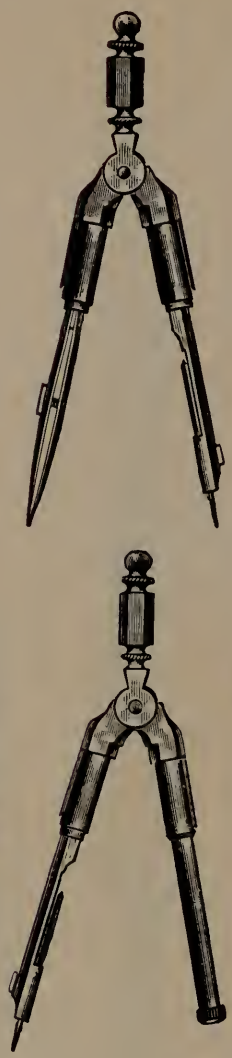
Highest Grade

Made of Rolled German Silver and Best English Steel.
Each Instrument stamped E. D. Co., or Union.
Illustrations ⅔ size.

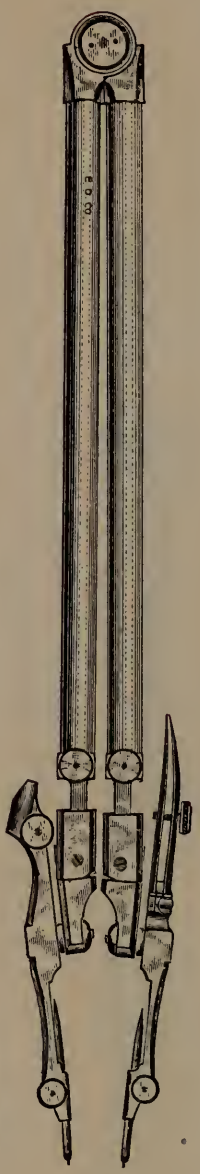


No. 644.
Open
for large circles.

644.
Folded.



644.
Drawn out
for small circles.



644½.

No. 644. Pillar Pocket Compasses, with two needle points and pen and pencil points, which can be withdrawn from Compasses to be used separately as Bow Pencil and Bow Pen, respectively, Each, $10 20

644C. No. 644, in morocco pocket case, ... Each, 11 70

644½. Tubular Compasses, 10 in., with steel slide bars, each extending 14⅝ in., and pencil, pen and needle points, . Each, 17 00

Any circle up to about 50 in. diameter can be made with this instrument.

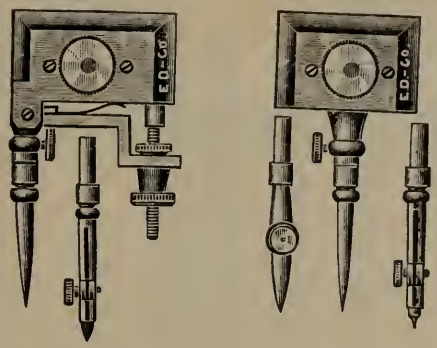
GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Each Instrument stamped E. D. Co. or Union.

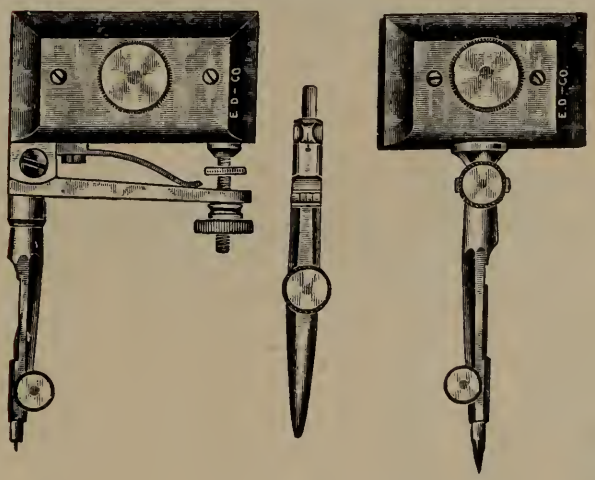
Illustrations ⅔ size.



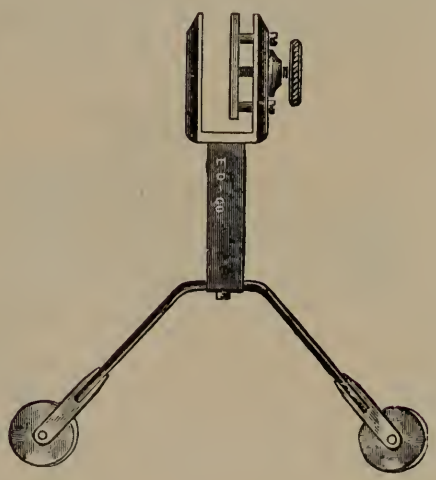
No. 645.

No. 645. Minute Beam Compasses, with 2 steel points, pen, pencil and needle point, ... Each, $ 7 50

645C. Minute Beam Compasses No. 645 in morocco pocket case, silk velvet lined, ... " 8 75



No. 646.



647.

No. 646. Beam Compasses, to fit on any straight edge, with two needle points, exchangeable for lead, and pen point, and micrometer adjustment, ... Each, $ 8 50

646C. Beam Compasses No. 646 in morocco pocket case, silk velvet lined, ... " 9 75

647. Wheel attachment for No. 646, ... " 2 25

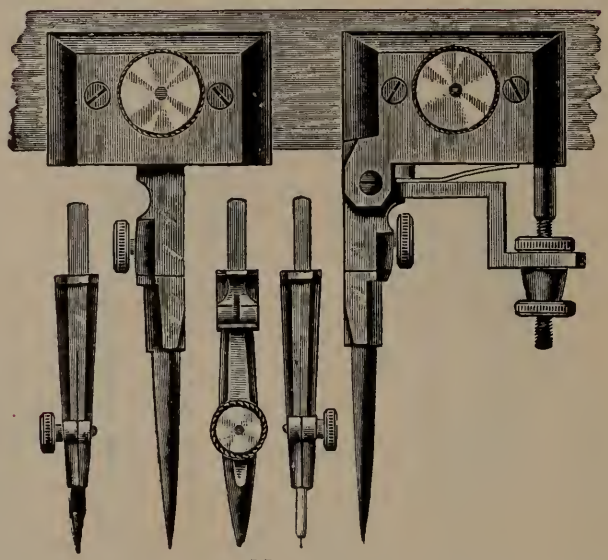
647C. Nos. 646 and 647, in morocco pocket case, silk velvet lined, ... " 12 50

For Beam Compass Bars, see No. 2119.

GEM UNION INSTRUMENTS

Highest Grade

Illustrations ⅔ size.



Each Instrument stamped E. D. Co. or Union.

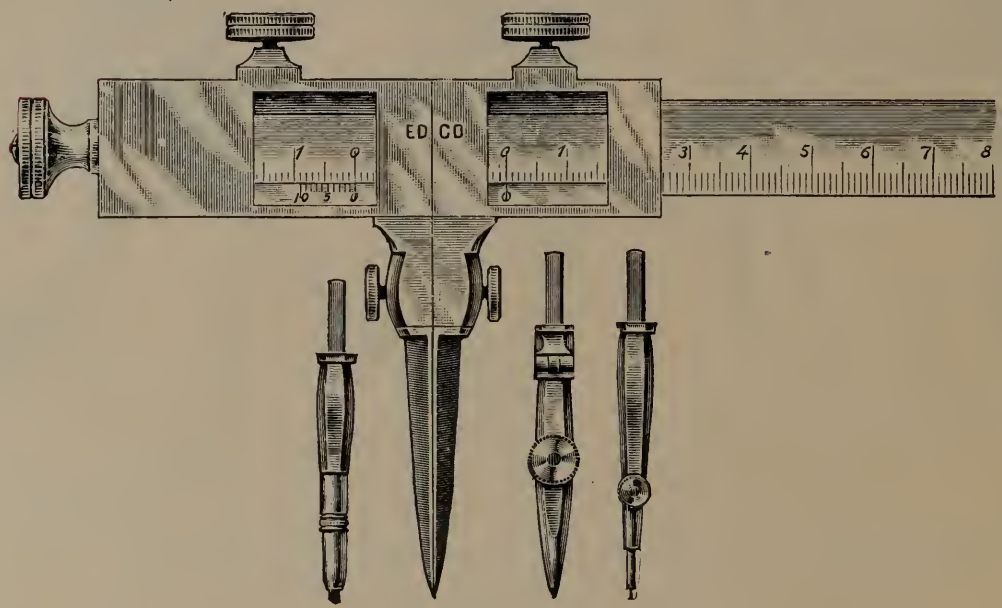
No. 648.

No. 648. Beam Compasses, to fit any straight edge, with two steel points, pen, pencil and needle point, and micrometer adjustment, ... Each, $ 9 00

648C. Beam Compasses, No. 648 in morocco pocket case, silk velvet lined, ... " 10 25

648½. Wheel attachment for No. 648, ... " 2 25

649C. Nos. 648 and 648½ in morocco pocket case, silk velvet lined, ... " 13 00



No. 650.

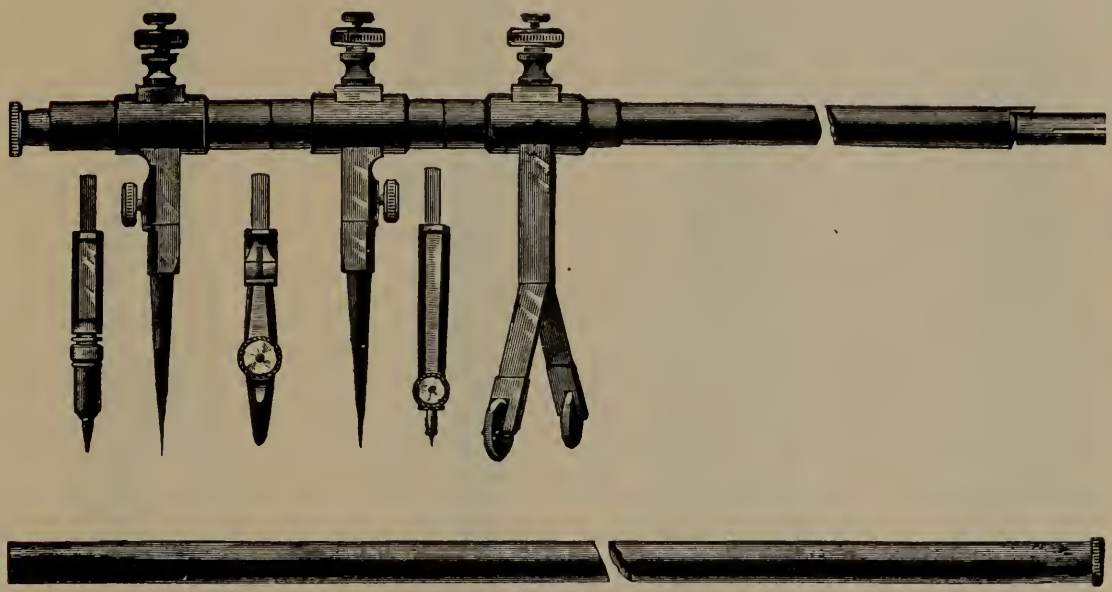
No. 650. German Silver Beam Compasses, with 2 triangular steel points, pen, pencil and needle points and wheel attachment; rectangular tubular bar of German silver 44 in. long, micrometer adjustment; upper and lower edge and verniers graduated to any scale desired. Instrument complete, in polished mahogany box, ... Each, $35 00

GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.

Illustrations ⅔ size.



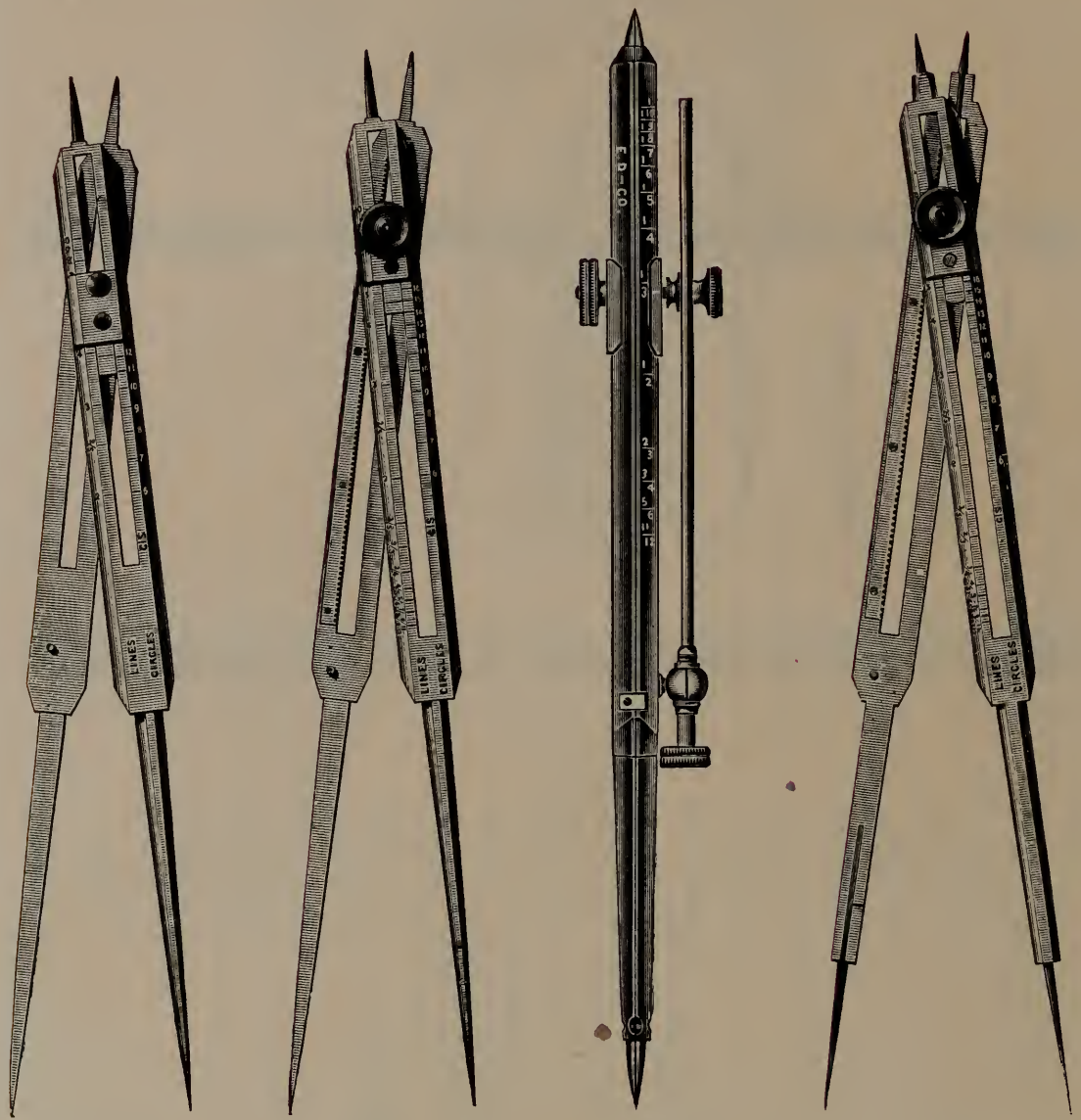
No. 651.—With Wheel Attachment, No. 654.

No. 651.	Tubular Beam Compasses, 18 in., 2 round German silver bars, with 2 steel points, pen, pencil and needle point, with micrometer adjustment. . . . . Each,	$10 50
652.	Tubular Beam Compasses, 24 in., 2 bars, . . . "	11 75
653.	" " " 36 in., 3 " . . . "	15 25
651C.	" " " No. 651 in morocco case, "	12 50
652C.	" " " No. 652 " " " " "	14 00
653C.	" " " No. 653 " " " " "	18 50
654.	Wheel Attachment for Nos. 651 or 652, ... "	2 50
654½.	" " " No. 653, ... "	2 75
651W.	No. 651 and No. 654 in morocco case, ... "	15 00
652W.	No. 652 " " 654 " " " " . . . . "	17 00
653W.	No. 653 " " 654½ " " " . . . . "	21 75

GEM UNION INSTRUMENTS

Highest Grade

Ill. ⅔ size. Illustrations ½ size.



No. 655. 658. 660. 663.

No. 655. Proportional Dividers, 7½ in., finely graduated for lines and circles, ... Each, $10 00

658. Proportional Dividers, 8½ in., with rack movement, finely graduated for lines and circles, ... " 12 50

660. Proportional Dividers, 9 in., with micrometer adjustment, finely graduated for lines, circles, planes and solids, ... " 16 50

663. Proportional Dividers, 9 in., with rack movement and movable points, finely graduated for lines and circles, " 15 00

Morocco Cases, lined with silk velvet, for:

	No. 655	658	660	663
Each, . . .	$0 80	$0 90	$1 20	$1 10

GEM UNION INSTRUMENTS

Highest Grade

STANDARD PROPORTIONAL DIVIDERS

An improved instrument, graduated in such a manner that with the aid of table furnished, any ratio may be speedily and accurately set off.

Illustration ½ size.

No. 666.

The purposes for which these Dividers may be used are almost limitless. The engraved divisions run from 10 to 110 and with the aid of the vernier to 1,000. A table giving a large number of settings such as "Diameter and Circumference of a Circle," "Diameter of a Circle and Side of Inscribed Square," "Side of Cube and Diameter of Equal Sphere," "Miles and Kilometers," etc., etc., is furnished with each instrument, and by means of a simple formula any setting not given may be easily obtained.

After having obtained the setting for the desired ratio, the slide is moved to that point, when the ends of the dividers will indicate the ratio.

Thus:

According to the table, the setting for "Miles and Kilometers" is 767, and the slide being moved to that point with the aid of the vernier, the ends of the instrument will indicate the desired ratio.

Each division of the Standard Proportional Divider represents one 200th part of its entire length, but only 100 divisions appear on the instrument.

No. 666. Standard Proportional Dividers, 10 in., with rack movement and table of settings. In polished case, ... Each, $14 00

667. Standard Proportional Dividers, 10 in., with rack movement and movable points and table of settings. In polished case, ... Each, 17 00

GEM UNION INSTRUMENTS

IN POCKET BOOK STYLE CASES, LINED WITH SILK VELVET.

The Highest Grade of Instruments.

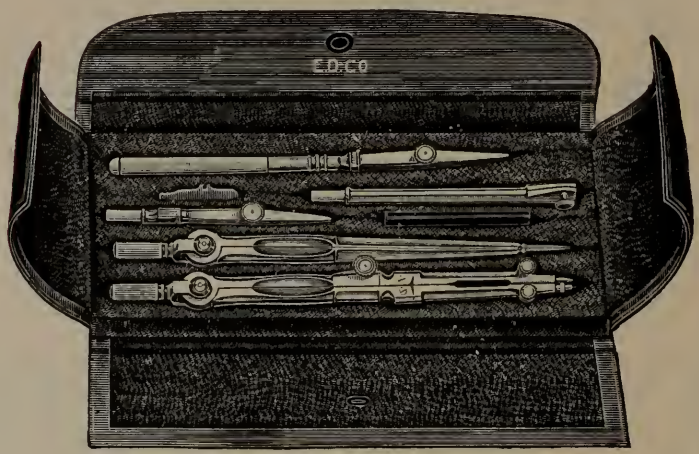
Made of Rolled German Silver and Best English Steel.

For description of Instruments, see pages 47-51.

Our assortment comprises a selection of the most desirable instruments, fitted in cases. Any other assortments in Pocket Book Style Cases or Morocco Pocket Cases, fitted up to order at short notice.

No. 685.

No. 685. Cont'g:
No. 518 Ruling Pen, 4 in., with joint, ivory handle.
598 Plain Dividers, 4¼ in., Union pivot joint and clamp.
628 Compasses, 4¼ in., fixed needle point, pen and pencil point, Union pivot joint and clamp.
Box with Leads. Per set, ... $12 00



No. 688.

No. 688. Cont'g:
No. 520 Ruling Pen, 5½ in., with pin and joint, ivory handle.
603 Plain Dividers, 6 in., Union pivot joint and clamp.
631 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.
Box with Leads. Per set, ... $14 50

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 690.

No. 690. Cont'g:

No. 506 Ruling Pen, 4¼ in., with spring and ebony handle.

520 " " 5½ " with pin and joint, ivory handle.

566 Steel Spring Bow Pen, 3½ in., metal handle.

603 Plain Dividers, 6 in., Union pivot joint and clamp.

631 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.

Box with Leads. Per set, ... $19 00

No. 691. Containing the same as No. 690, but having Cylindrical Dividers No. 635 and Compasses No. 642 in place of Nos. 603 and 631.

Per set, ... $18 40

Any other assortments in morocco cases fitted up to order at short notice.

For description of Instruments, see pages 47-51.

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 693.

No. 693. Cont'g:

No. 507 Ruling Pen, 5 in., with spring and ebony handle.

565 Steel Spring Bow Pencil, 3½ in., metal handle.

566 " " " Pen, 3½ " " "

618 Hairspring Dividers, 6 in., Union pivot joint and clamp.

631 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.

Box with Leads. Per set, ... $21 00

No. 694. Containing the same as No. 693, but having Cylindrical Hairspring Dividers No. 637 and Compasses No. 642 in place of Nos. 618 and 631.

Per set, ... $20 40

Any other assortment of instruments fitted into a case at short notice.

See Empty Morocco Cases on pages 161-162.

For description of Instruments, see pages 47-51.

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 695.

No. 695. Cont'g:

No. 506 Ruling Pen, 4¼ in., with spring and ebony handle.

508 " " 5½ " " " " " " "

564 Steel Spring Bow Dividers, 3½ in., metal handle.

565 " " " Pencil, 3½ " " "

566 " " " Pen, 3½ " " "

618 Hairspring Dividers, 6 in., Union pivot joint and clamp.

631 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.

Box with Leads. **Per set,** $24 00

No. 696. Containing the same as No. 695, but having Cylindrical Hairspring Dividers No. 637 and Compasses No. 642 in place of Nos. 618 and 631.

Per set, ... $23 60

Any other assortments in morocco cases fitted up to order at short notice

For description of Instruments, see pages 47-51.

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 700.

No. 700. Cont'g:

No. 506 Ruling Pen, 4¼ in., with spring and ebony handle.

508 " " 5½ " " " " " "

564 Steel Spring Bow Dividers, 3½ in., metal handle.

565 " " " Pencil, 3½ " " "

566 " " " Pen, 3½ " " "

618 Hairspring Dividers, 6 in., Union pivot joint and clamp.

632 Compasses, 6 in., hairspring, with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.

Box with Leads. Per set, ... $25 00

No. 702. Containing the same as No 700, but having center wheel Bows Nos. 568, 569 and 570 in place of Nos. 564, 565 and 566.

Per set, ... $26 00

For description of Instruments, see pages 47-51.

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 710.

No. 710. Cont'g:

No. 507 Ruling Pen, 5 in., with spring and ebony handle.

537 Swedish Detail Pen, 6 in., ebony handle.

568 Steel Spring Bow Dividers, 3½ in., metal handle.

569 " " " Pencil, 3½ " " "

570 " " " Pen, 3½ " " "

618 Hairspring Dividers, 6 in., Union pivot joint and clamp.

632 Compasses, 6 in., hairspring, with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.

Box with Leads. Per set, ... $26 40

No. 712. Containing the same as No. 710, but having Compasses No. 631 in place of No. 632.

Per set, ... $25 40

For description of Instruments, see pages 17-51.

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 715.

No. 715. Cont'g:

No. 506 Ruling Pen, 4¼ in., with spring and ebony handle.
520 " " 5½ " with pin and joint, ivory handle.
564 Steel Spring Bow Dividers, 3½ in., metal handle.
565 " " " Pencil, 3½ " " "
566 " " " Pen, 3½ " " "
618 Hairspring Dividers, 6 in., Union pivot joint and clamp.
628 Compasses, 4¼ in., with fixed needle point, pen and pencil point, Union pivot joint and clamp.
633 Compasses, 7 in., with 2 steel points, pen, pencil point, needle point and lengthening bar, Union pivot joint and clamp.

Box with Leads. Per set, ... $34 50

No. 716. Containing same assortment as No. 715, but having Compasses No. 631 in place of No. 633 and Ruling Pen No. 508 in place of No. 520.

Per set, ... $31 50

Any other assortments in morocco cases fitted up to order at short notice.

See Empty Morocco Cases on pages 161-162.

GEM UNION INSTRUMENTS IN CASES *Highest Grade*

Made of Rolled German Silver and Best English Steel.

No. 720.

No. 720. Morocco Case, with recessed and partitioned lid with hinged cushion. The lid is arranged for holding pencils, penholders, pens, rubber, tacks, chinese ink, pencil pointer, etc.

Cont'g:

- No. 506 Ruling Pen, 4½ in., with spring and ebony handle.
- 508 " " 5½ " " " " " " "
- 564 Steel Spring Bow Dividers, 3½ in., metal handle.
- 565 " " " Pencil, 3½ " " "
- 566 " " " Pen, 3½ " " "
- 618 Hairspring Dividers, 6 in., Union pivot joint and clamp.
- 631 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, Union pivot joint and clamp.

Box with Leads. Per set, ... $25 25

No. 722. Morocco Case, containing the same as No. 720, but having Compasses No. 632 in place of No. 631.

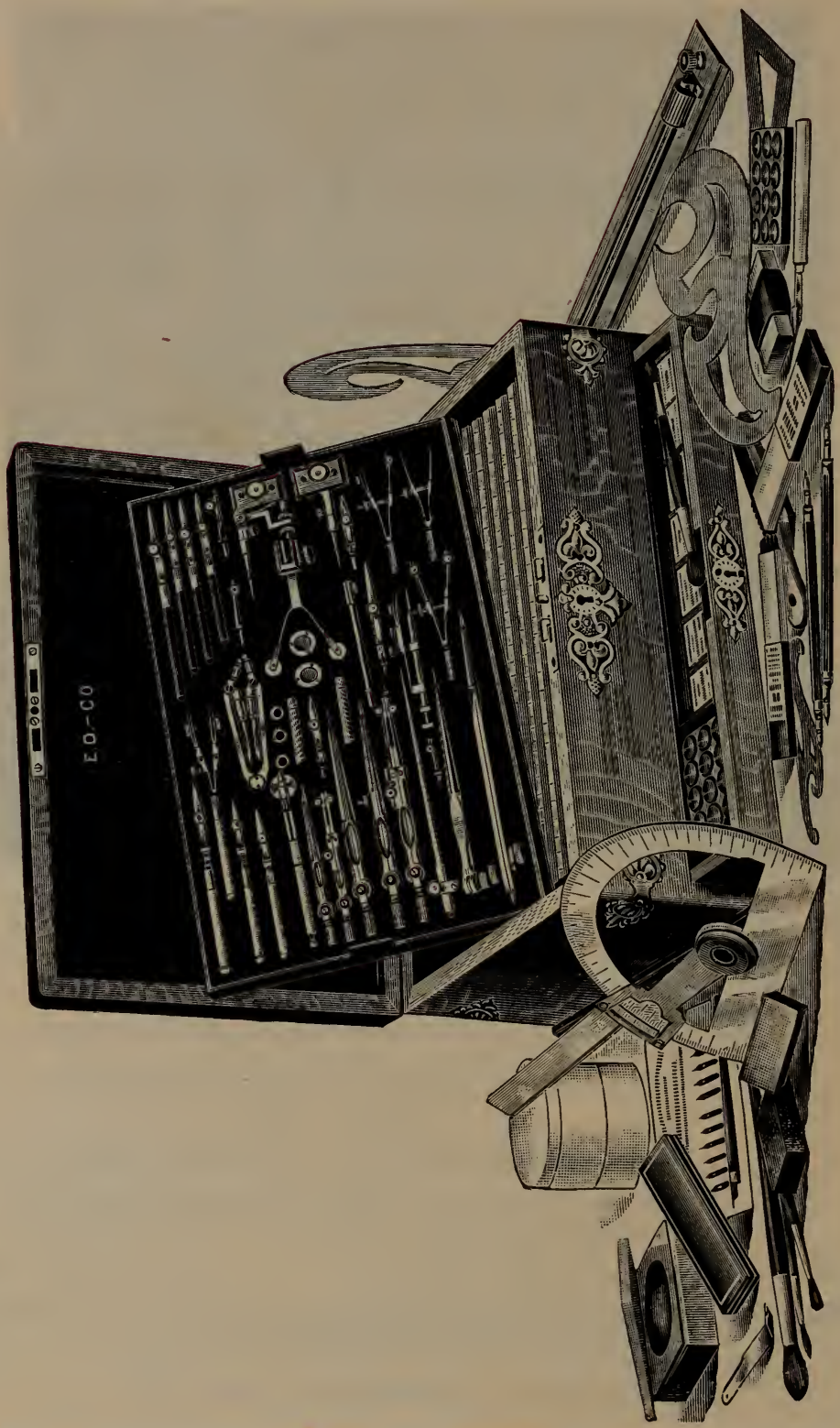
Per set, ... 26 25

For description of Instruments, see pages 47-51.

GEM UNION INSTRUMENTS

Highest Grade

Made of Rolled German Silver and Best English Steel.



No. 723. (See next page.)

No. 723. Containing a very complete outfit of the best tools, in fine polished case with German silver corners, lock, tray and drawer, viz.:

No. 506, 1 Ruling Pen, 4¼ in., spring on upper blade, ebony handle;
507, 1 " " 5 " " " " " " " "
508, 1 " " 5½ " " " " " " " "
511. 1 " " 5 in., ebony handle; slide catch cleaning device;
518, 1 Ruling Pen, 4 in., with joint and ivory handle;
519, 1 " " 4¾ " with joint and pin, ivory handle;
520, 1 " " 5½ " " " " " " " "
532, 1 Railroad Pen, 5 in., ivory handle;
564, 565, 566, 1 set of 3 Steel Spring Bow Instruments;
584. 1 Self-Adjusting Spring Bow Pen with pencil point;
535½, 1 Dotting Pen;
598, 1 Plain Divider, 4¼ in., Union pivot joint and clamp;
603, 1 " " 6 in., Union pivot joint and clamp;
608, 1 Three-legged Divider, 6 in., with adjustable leg;
618, 1 Hairspring Divider, 6 in., Union pivot joint and clamp;
628, 1 Compass, 4¼ in., with fixed needle point, pen and pencil point, Union pivot joint and clamp;
631, 1 Compass, 6 in., with pencil, pen and fixed needle point and lengthening bar, Union pivot joint and clamp;
644, 1 Pillar Compass;
648, 1 Beam Compass;
648½, 1 Beam Compass Wheel Attachment;
658, 1 Proportional Divider, 8½ in., with rack movement;
976, 2 boxes with Leads;
1581, 1 set of 8 Boxwood Scales, 12 in., full divided, ⅛, ¼, ⅜, ½ ¾, 1, 1½, 3 inch to the foot;
1852, 1 German Silver Rolling Parallel Rule, 12 in.;
1976, 1 " " Vernier Protractor, 8 in.;
2021, 1 Transparent Ambro Triangle, 10 in.;
2022, 1 " " " 8 in.;
2152, 1 " " Curve, each No. 6, No. 13, No. 15;
2364, 2376, 2 doz., each, Gem Union Thumb Tacks;
2460, 1 Tack Lifter;
2466, 2 Horn Centers, with German silver rim;
2600Q, 1 cake Chinese Ink;
2800, 1 whole pan, each, W. N. Water Colors—
8, 12, 16, 24, 26, 29, 46, 54, 70, 72.
2801, 1 whole pan, each, W. N. Water Colors—108, 128;
2802, 1 whole pan, W. N. Water Colors—200;
2803, 1 whole pan, W. N. Water Colors—320;
2920, 1 each, Camel Hair Brush, 1, 2, 3, 4, 5, 6;
2920, 1 Camel Hair Brush, 12;
2930, 1 each, Double Pointed Camel Hair Brush, 1, 3;
2940, 1 each, Red Sable Brush, 1, 3, 5, 7, 8, 10;
3000, 1 Slate Ink Slab;
3011, 1 nest of Saucers;
3110, 2 double-pointed Siberian Artists' Pencils;
3120, 3 boxes Siberian Leads;
3321, 1 Sponge Rubber;
3350, 2 Artists' Rubber, large;
3361, 2 Ink Erasers, large;
3371, 1 Ink and Pencil Eraser;
3396, 1 Steel Eraser;
3416, 1 Pencil Pointer;
3452, 1 doz. finest Steel Pens, with Holder.

No. 723, complete, ... Each, $185 00

RICHTER'S INSTRUMENTS OF PRECISION

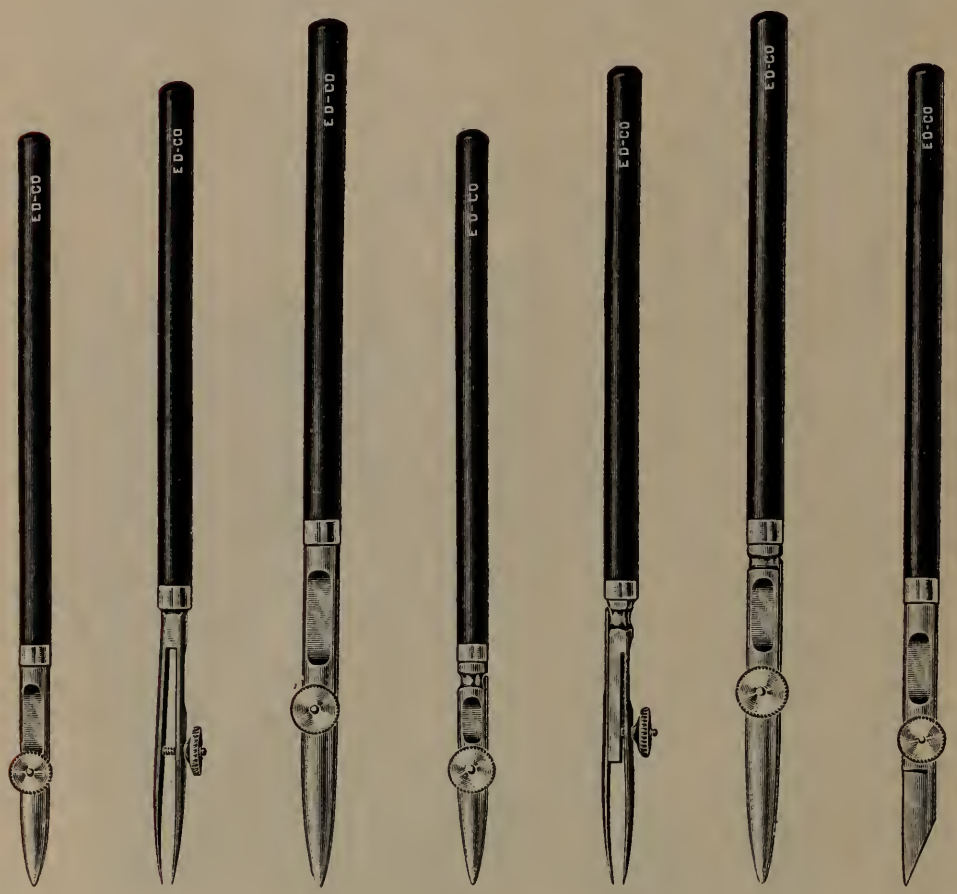
SOLD ONLY BY US OR DEALERS HANDLING OUR GOODS.

The Highest Grade of Instruments.

Each Instrument stamped E. D. Co. or ℞.

For description, see pages 52-55.

Illustrations ⅔ size.



No. 725. 726. 727. 728. 729. 730. 730½.

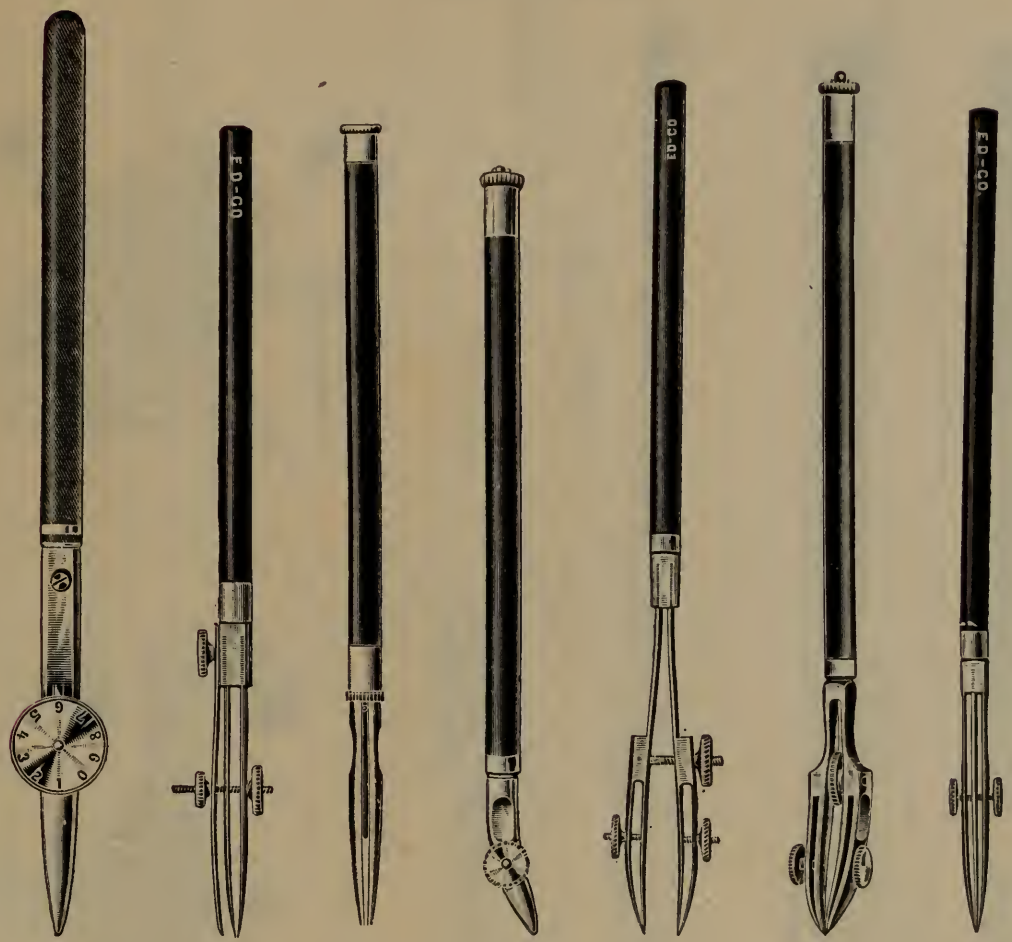
No. 725.	Ruling Pen,	4½	in.,	metal	handle,	.	.	.	.	.	.	Each,	$1	00
726.	"	"	5	"	"	"	.	.	.	.	.	.	"	1	20
727.	"	"	5½	"	"	"	.	.	.	.	.	.	"	1	35
728.	"	"	4½	"	"	"	with cross joint,					.	"	1	50
729.	"	"	5	"	"	"	"	"	"			.	"	1	65
730.	"	"	5½	"	"	"	"	"	"			.	"	1	80
730½.	"	"	5	"	"	"	for fine lines,					.	"	1	50

Ruling Pens with cross joint are so constructed that the blades may be easily separated and thoroughly cleaned, without disturbing the adjusting screw, thereby preserving the original adjustment.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.

Illustrations ⅔ size.



No. 731. 732½. 733. 734. 736. 737. 738.

No. 731.	Ruling Pen 5½ in., with graduated thumb screw, .	Each,	$1 80
732.	" " 5½ " " thumb screw and cross joint,	"	2 40
732½.	" " 5 " " third blade, by means of which cross hatching can be easily done and the lines minutely regulated, ...	"	1 75
733.	Wedge Ruling Pen, 5¼ in., which opens and closes by turning thumb screw at upper end of handle, . . .	"	1 50
734.	Curve Pen, 4¾ in., blades fastened to a rod in a hollow handle, with screw at upper end to set pen firm for straight lines, or loose to follow curves, ...	"	1 65
736.	Railroad Pen, 5¼ in., black handle, ...	"	2 70
737.	Double Curve Pen, 5¼ in., same construction as No. 734,	"	4 80
738.	Three-tongued Pen, 5 in., for heavy lines, ...	"	2 00

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.

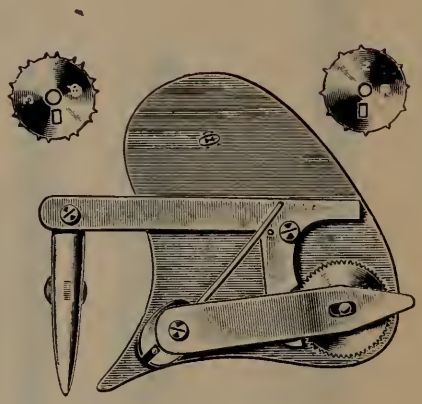
Illustrations ⅔ size.

No. 739.

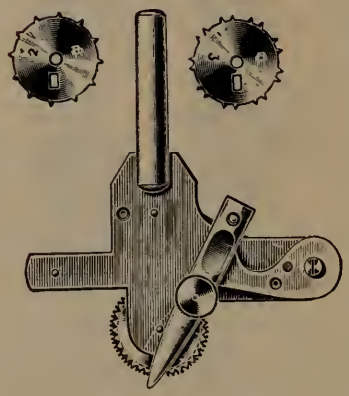
740.

742.

743.



745.



745½.

No. 739.	Swedish Ruling Pen, 6 in., flat ebony handle, . .	Each, $1 35
740.	" " " 6 " " " " . .	" 1 50
742.	Double Ruling Pen, 6¼ in., to draw at one stroke either one broad line or two lines of equal or different thickness, ...	" 3 50
743.	Pricker, 2⅜ in., new construction, ...	" 90
745.	Dotting Instrument with three wheels, in case, . .	" 4 20
745½.	Circle Dotting Instrument with three wheels; is made to fit beam compasses No. 783, in case, ...	" 4 20

Additional wheels for Nos. 745 and 745½ can be furnished at 25 cents each.

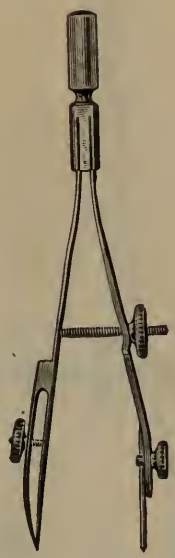
For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.
Illustrations ⅔ size.

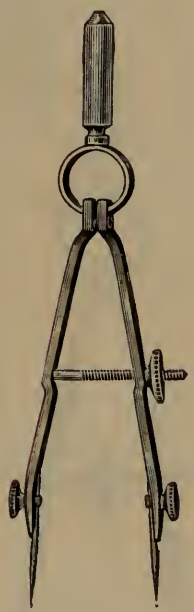
No. 746.

747.

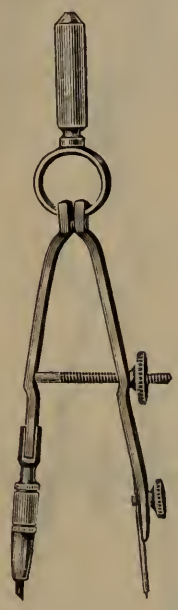


748.

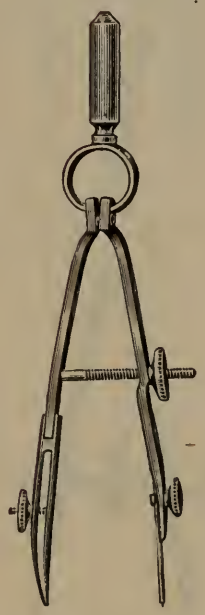
No. 746.	Steel Spring Bow Dividers, 3½ in., metal handle, .	Each,	$2 00
747.	" " " Pencil, 3½ " " " . .	"	2 40
748.	" " " Pen, 3½ " " " . .	"	2 60
749.	Set of Bows, Nos. 746, 747, 748, in case, ...	Per set,	8 20



No. 750A.



750B.



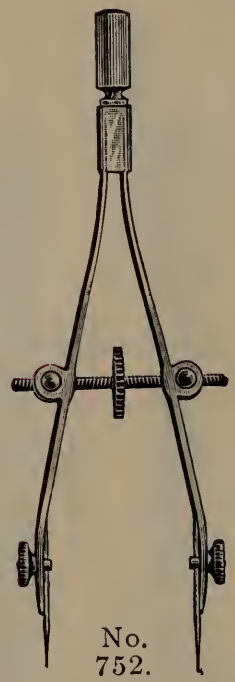
750C.

			Each.
No. 750A.	Circular Steel Spring Bow Dividers, 3½ in., metal handle, .		$2 00
750B.	" " " " Pencil, 3½ " " " .		2 40
750C.	" " " " Pen, 3½ " " " .		2 60
750D.	Set of Bows, Nos. 750A, 750B, 750C, in case, . .	Per set,	8 20
751A.	Circular Steel Spring Bow Dividers, 4¼ in., metal handle, .		2 40
751B.	" " " " Pencil, 4¼ " " " .		2 80
751C.	" " " " Pen, 4¼ " " " .		3 20
751D.	Set of Bows, Nos. 751A, 751B, 751C, in case, . .	Per set,	9 60

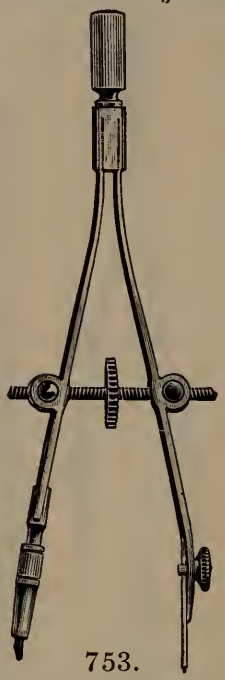
For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

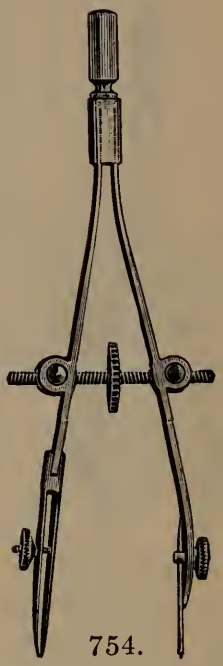
Each Instrument stamped E. D. Co. or ℜ.
Illustrations ⅔ size.



No. 752.



753.



754.

No. 752. Steel Spring Bow Dividers, 3¾ in., metal handle, ... Each, $3 00
753. " " " Pencil, 3¾ " " " . . . . . " 3 30
754. " " " Pen, 3¾ " " " . . . . . " 3 60
754½. Set of Bows, Nos. 752, 753, 754, in case, ... Per set, 11 20

No. 756.

757.

758.

No. 756. Circular Steel Spring Bow Dividers, 4¼ in., metal handle, ... Each, $3 00
757. " " " " Pencil, 4¼ " " " . . . . . " 3 30
758. " " " " Pen, 4¼ " " " . . . . . " 3 60
759. Set of Bows, Nos. 756, 757, 758, in case, ... Per set, 11 20

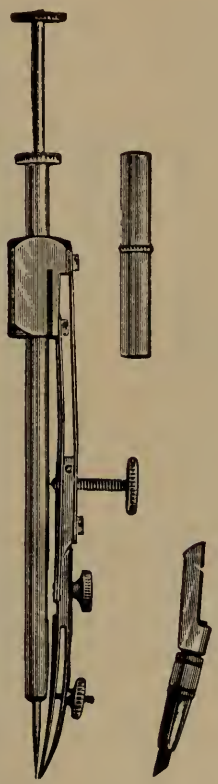
These Bows are easily regulated with one finger, by means of the little wheel which moves on a right and left thread.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

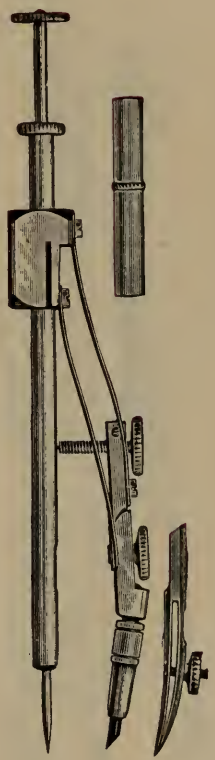
Each Instrument stamped E. D. Co. or ℞.

Illustrations ⅔ size.

No. 760.



761. (Closed.)



761. (Open.)

No. 760. Self-Adjusting Spring Bow Pen, 4½ in., ... Each, $3 75

761. " " " " with Pencil Point, 4½ in., " 5 00

Most suitable for small circles and superior to all other instruments of this kind as the two parallel springs shown in illustration hold the pen or pencil point in the same relative position regardless of the diameter of circle to be drawn.

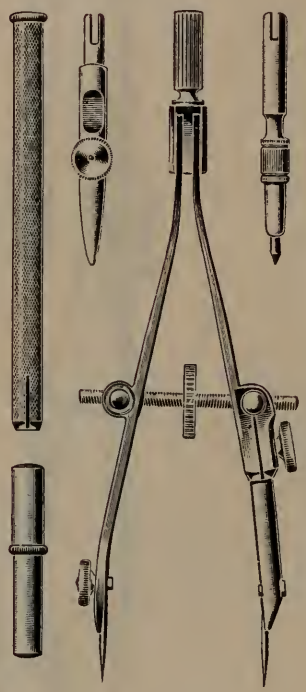
A rod serving as handle and needle point passes through a hollow tube. While the rod remains stationary turn the screw head of tube without pressure, since pen and pencil draw by their own weight. Hold straight while turning.

For description of Instruments, see pages 52-55.

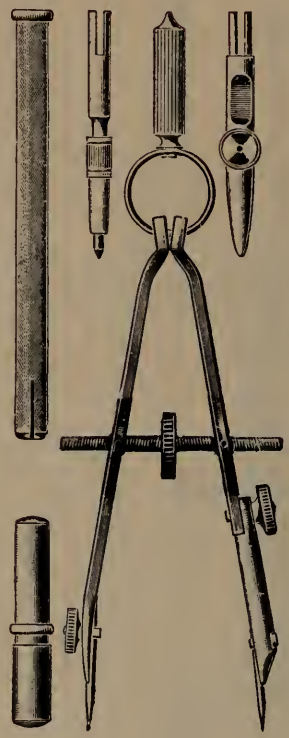
RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.

Illustrations ⅔ size.



N . 763.



764.

No. 763. Steel Spring Bow Compasses, 3¾ in., with pen and pencil points, leadbox and handle to hold reserve needle points. The pen and pencil points can be used as Ruling Pen and Pencil respectively by inserting them into the handle, in case, ... Each, $6 00

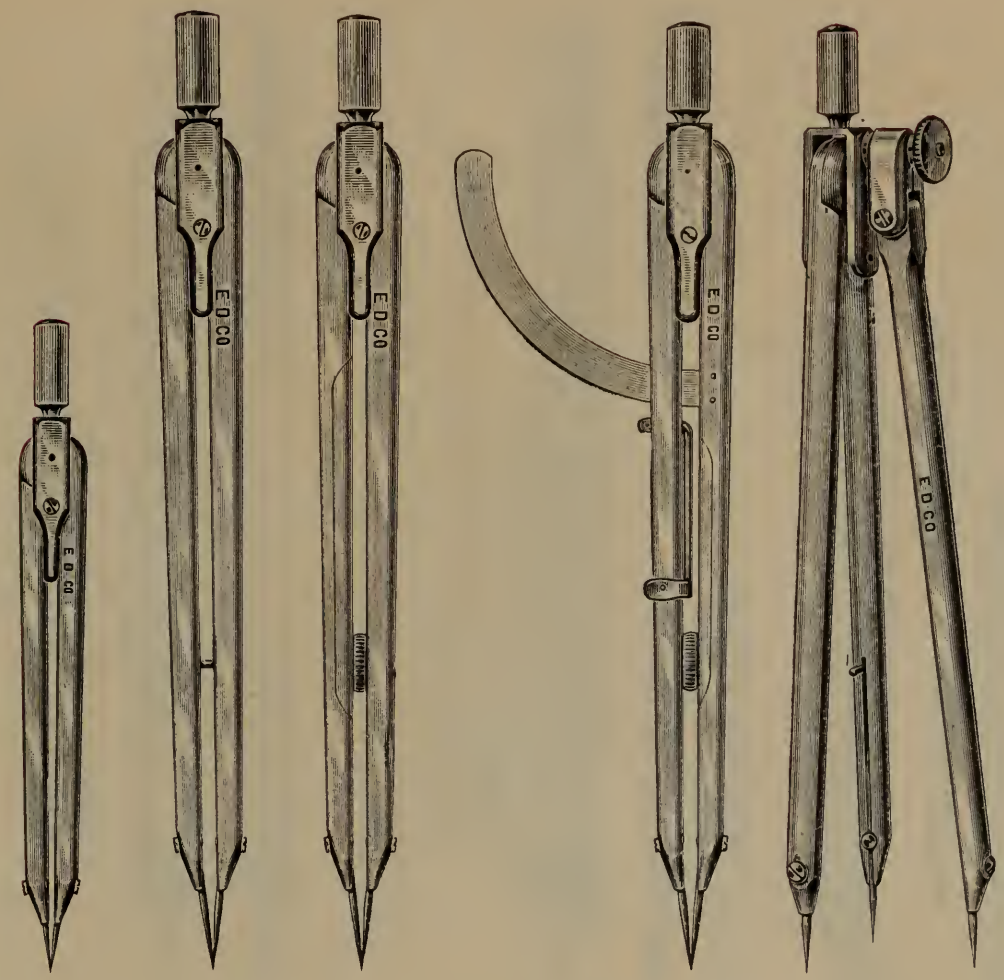
764. Steel Spring Bow Compasses, 4 in., with pen and pencil points, leadbox and handle to hold reserve needle points. The pen and pencil points can be used as Ruling Pen and Pencil respectively by inserting them into the handle, in case, ... Each, 6 00

These combination instruments can be arranged to cover all ordinary work when the diameter of circle is 4 inches or less.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.

Illustrations ⅔ size.



No. 765. 766. 769. 771. 773.

No. 765.	Plain Dividers, 4 in., with replaceable steel points, .	Each,	$2 25
766.	" " 5¾ " " " " " " .	"	2 70
767.	" " 6½ " " " " " " .	"	3 00
768.	Hairspring Dividers, 4 in., with replaceable steel points,	"	3 20
769.	" " 5¾ " " " " " "	"	3 60
770.	" " 6½ " " " " " "	"	4 20
771.	" " 5¾ " with self-adjusting arc,	"	4 50
773.	Three-legged Dividers, 5½ in., with replaceable steel points,	"	5 00

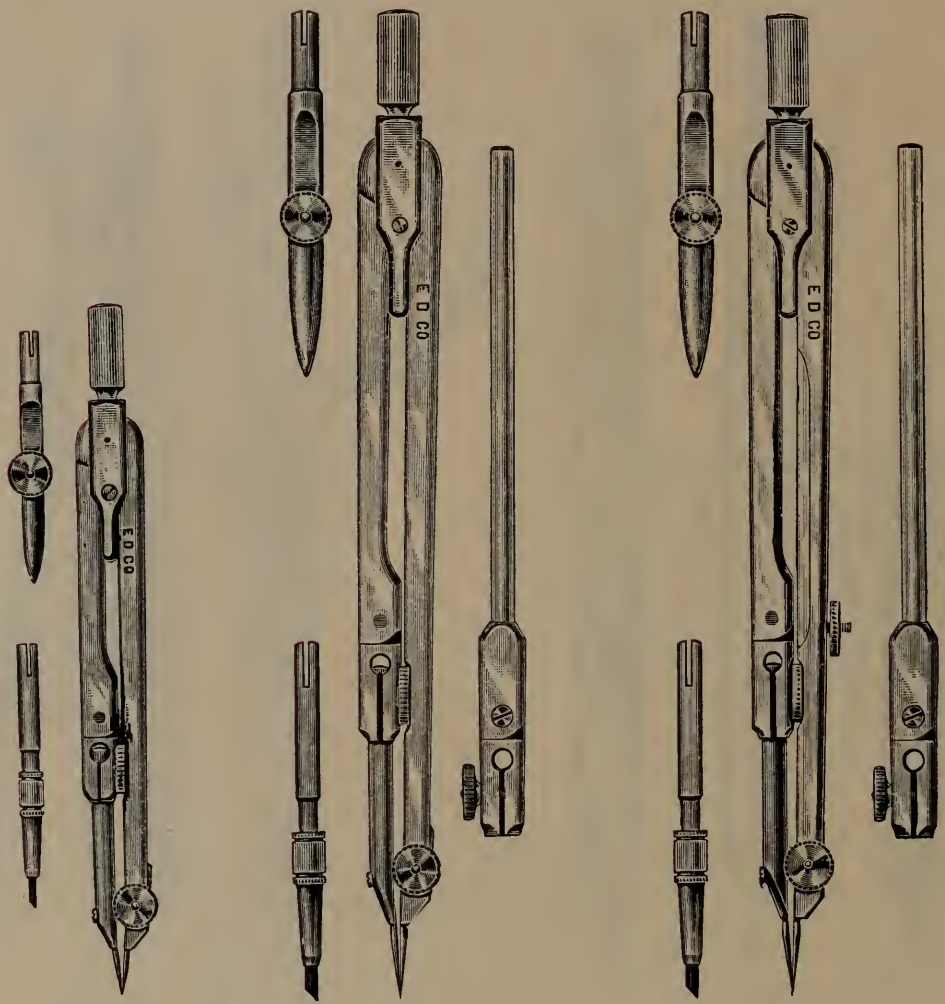
Dividers Nos. 765 to 771 have Straightening Device.

For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.

Illustrations ⅔ size.



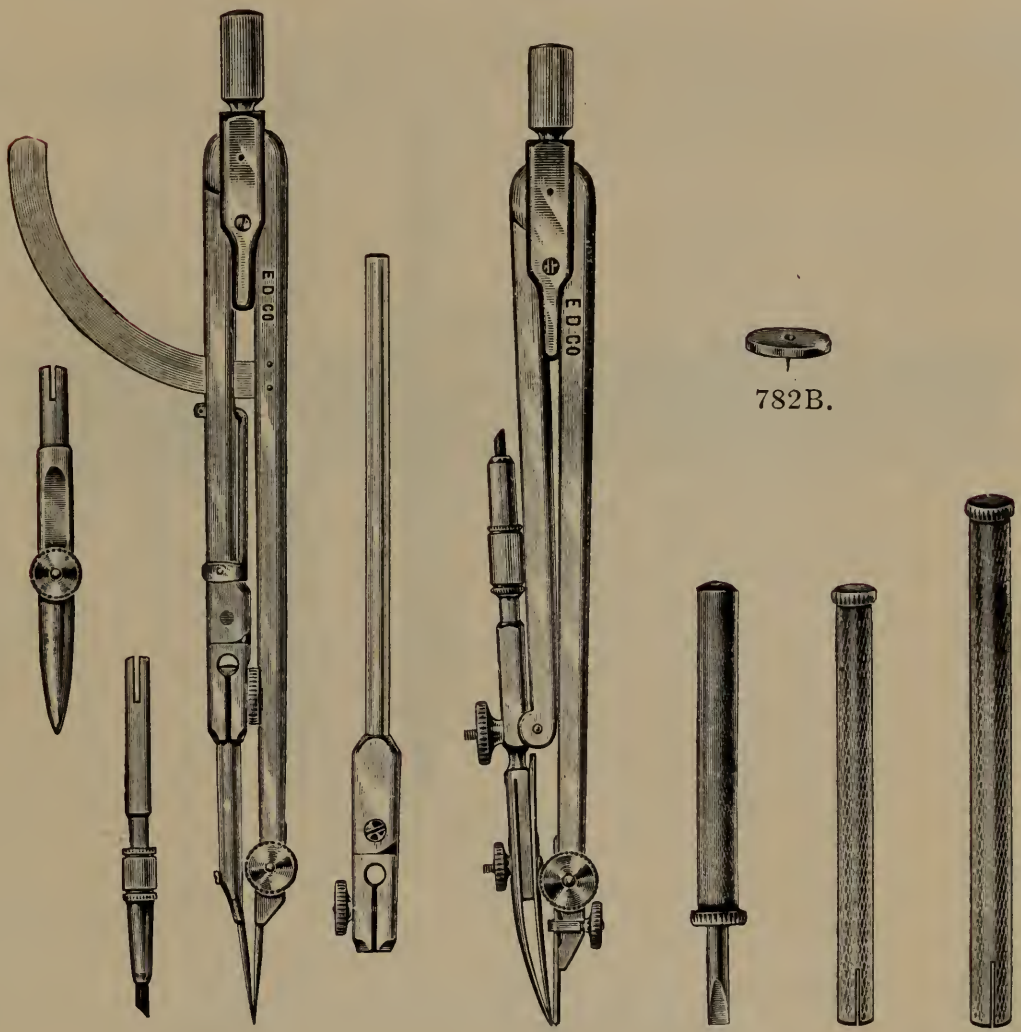
No. 775. 777. 779.

No. 775.	Compasses, 4 in., with replaceable needle points, pen and pencil points, key and leadbox, ...	Each,	$5 40
775C.	Compasses, 4 in., like No. 775, but with cross-joint pen,	"	6 00
776.	Compasses, 4 in., **hairspring,** with replaceable needle points, pen and pencil points and lengthening bar, key and leadbox, ...	"	6 50
777.	Compasses, 6 in., with replaceable needle points, pen and pencil points and lengthening bar, key and leadbox,	"	6 50
777C.	Compasses, 6 in., like No. 777, but with cross-joint pen,	"	7 20
778.	" 7 " otherwise same as No. 777, . . .	"	7 80
779.	" 6 " **hairspring,** with replaceable needle points, pen and pencil points and lengthening bar, key and leadbox, ...	"	7 50

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.

Illustrations ⅔ size.



782B.

No. 780. 781. 782A. 782C. 782D.

No. 780.	Compasses, 6 in., with self-adjusting arc, replaceable needle points, pen and pencil points, lengthening bar and straightening device, key and leadbox, . . .	Each,	$7 20
781.	Compasses, 6 in., with reversible pen and pencil points and straightening device, key and leadbox, ...	"	5 25
782A.	Combination Key and Leadbox, ...	"	25
782B.	Center Tack, ⅜ in. diameter, ...	"	15
782C.	Metal Handle, 2½ in., holding four needle points, . . .	"	45
782D.	" " 3 " " " " " . . .	"	50

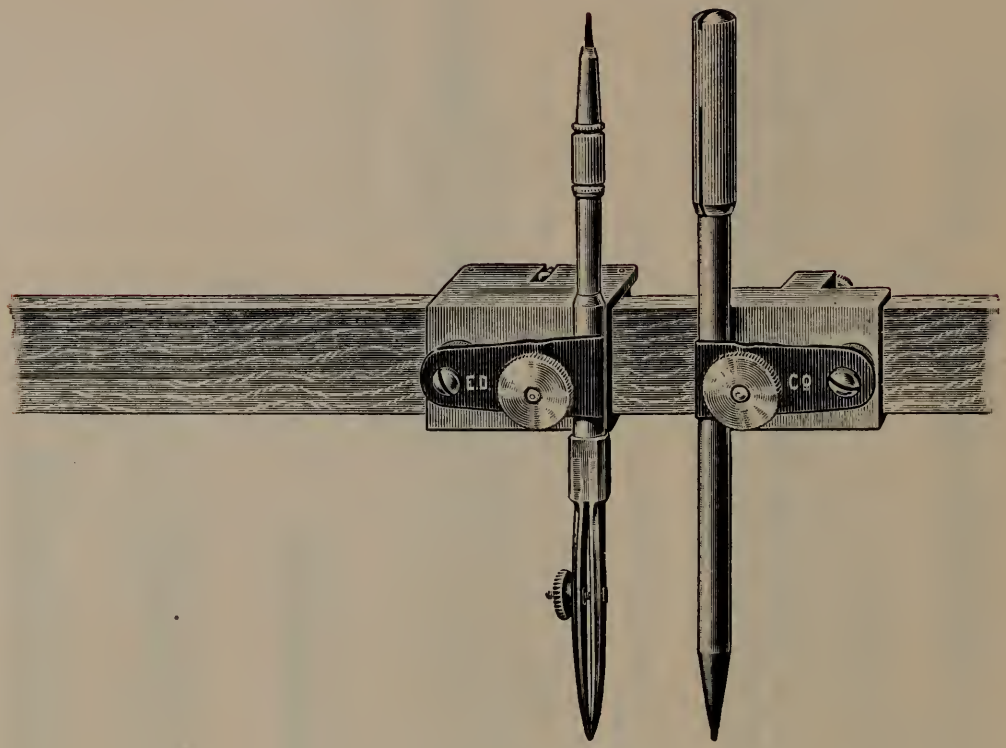
These Handles fit the pen, pencil and needle parts of Compasses, any one of which can in connection with the handle be used as a separate instrument.

No. 782C is for Nos. 775-776 Compass parts, and No. 782D for Nos. 777-780 Compass parts.

For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ℞.



No. 783.

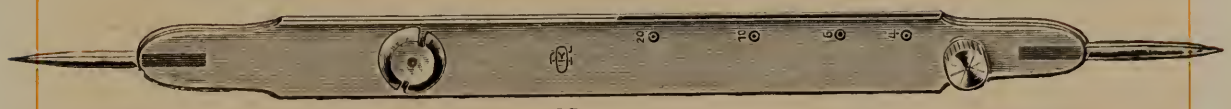
No. 783.	Beam Compasses, in case, ...	Each,	$7 50
783A.	Wooden Bar, Machine divided to $\frac{1}{16}$ in., 20 in. long,	"	2 25
783B.	" " " " $\frac{1}{16}$ " 40 " "	"	3 00

For plain Wooden Bars, see No. 2119.

These Beam Compasses differ from all others, principally in the fact that to set and adjust them no system of set screws, micrometer screws, etc., is needed. The movable compass holding the pen and pencil part is adjusted by means of a milled roller, which is held in contact with the bar by a strong steel spring, and is brought into any desired position by operating the roller with the finger.

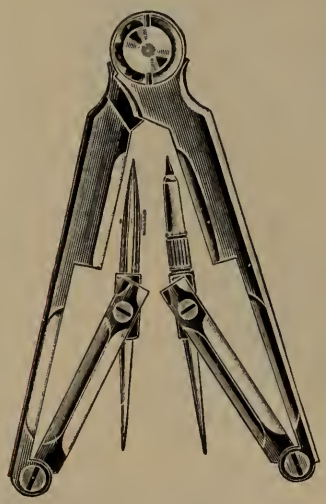
RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

Each Instrument stamped E. D. Co. or ER.



No. 785.

No. 787.



No. 784.

No. 784. Pocket Compasses, $3\frac{1}{8}$ in., when closed, . . . Each, $7 80

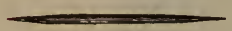
785. Whole and Half Dividers, 7 in., with round solid steel points for the following measurements, viz.: $\frac{1}{8}$ and $\frac{1}{4}$ in.; $\frac{3}{8}$ and $\frac{3}{16}$ in., $\frac{5}{8}$ and $\frac{3}{4}$ in., $\frac{1}{2}$ and 1 in., in case, " 6 60

787. Proportional Dividers, $7\frac{1}{4}$ in., for lines and circles, with adjusting pin for setting divisions, in case, . " 12 00

The construction of this instrument dispenses with the micrometer screw and permits of a quicker and at the same time reliable setting.

SEPARATE PARTS FOR RICHTER INSTRUMENTS

Illustrations full size.



A.

C.

E.

G.

B.

D.

F.

H.

No. 789A.	Plain Needle Points, small, ...	Each,	$0 10
789B.	" " " large, ...	"	10
789C.	Combination Plain and Shoulder Needle Points, small,	"	15
789D.	" " " " " " large,	"	15
789E.	T Bolts, small, for Ruling Pens, etc., ...	"	15
789F.	" " large, for Compasses, ...	"	15
789G.	Thumb Nuts, small, ...	"	20
789H.	" " large, ...	"	20
789I.	Dotting Wheels for Nos. 745 and $745\frac{1}{2}$, ...	"	25
789J.	Needle Point Holder for Compasses, ...	"	90
789K.	Pencil " for Compasses, ...	"	90
789L.	Pen " " "	"	1 20
789M.	Pen " " " with cross joint, . .	"	1 75
789R.	Lengthening Bar for Compasses Nos. 775-776, . .	"	90
789S.	" " " " " 777-780, . .	"	90

RICHTER'S INSTRUMENTS OF PRECISION

IN POCKET BOOK STYLE CASES, LINED WITH SILK VELVET.

The Highest Grade of Instruments.

Each Instrument stamped E. D. Co. or ℞.

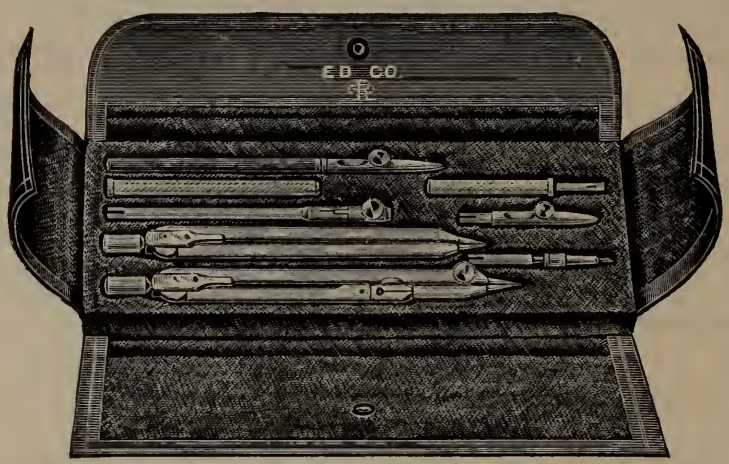
For description, see pages 52-55.

No. 790.

No. 790 Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle.
765 Plain Dividers, 4 in., with replaceable steel points.
775 Compasses, 4 in , with replaceable needle points, pen and pencil points, straightening device.
782A Combination Key and Lead Box.
782C Metal Handle, 2½ in., with four needle points.

Per set, ... $10 50



No. 791.

No. 791. Cont'g:

No. 726 Ruling Pen, 5 in., metal handle.
766 Plain Dividers, 5¾ in., with replaceable steel points.
777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.
782A Combination Key and Lead Box.
782D Metal Handle, 3 in., with four needle points.

Per set. $12 60

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES

Each Instrument stamped E. D. Co. or ℞.

No. 792.

No. 792. Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle
727 " " 5½ " " "
752 Steel Spring Bow Dividers, 3¾ in., metal handle.
761 Self-Adjusting Spring Bow Pen, with Pencil Point, 4½ in.
769 Hairspring Dividers, 5¾ in., with replaceable steel points.
777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.
782A Combination Key and Lead Box.
782B Center Tack, ⅜ in. diameter.
782D Metal handle, 3 in., with four needle points.

Per set, ... $23 50

No. 792½. Containing the same as No. 792, but with the addition of No. 775 Compasses, 4 in.

Per set, ... $29 50

For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES

Each Instrument stamped E. D. Co. or ℞.

No. 793.

No. 793. Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle.

727 " " 5½ " " "

746 Steel Spring Bow Dividers, 3½ in., metal handle.

747 " " " Pencil, 3½ " " "

748 " " " Pen, 3½ " " "

769 Hairspring Dividers, 5¾ in., with replaceable steel points.

777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.

782A Combination Key and Lead Box.

782B Center Tack, ⅜ in. diameter.

782D Metal handle, 3 in., with four needle points.

Per set, ... $23 50

No. 793H. Containing the same as No. 793, but with Hairspring Compasses No. 779 in place of No. 777.

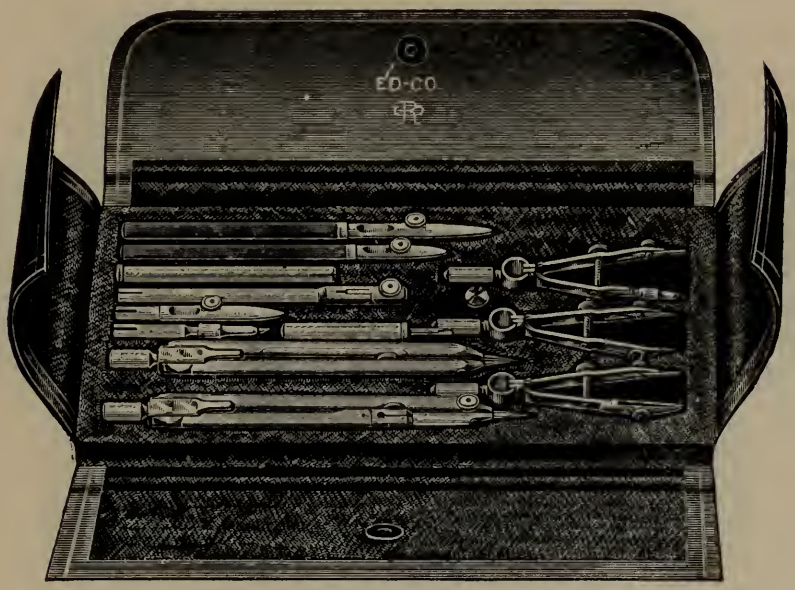
Per set, ... $24 50

For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES

Each Instrument stamped E. D. Co. or ED.



No. 795.

No. 795. Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle.
727 " " 5½ " " ".
750A Circular Steel Spring Bow Dividers, 3½ in., metal handle.
750B Circular Steel Spring Bow Pencil, 3½ in., metal handle.
750C Circular Steel Spring Bow Pen, 3½ in., metal handle.
769 Hairspring Dividers, 5¾ in., with replaceable steel points.
777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.
782A Combination Key and Lead Box.
782B Center Tack, ⅜ in. diameter.
782D Metal Handle, 3 in., with four needle points.
Per set, ... $23 50

No. 795H. Containing the same as No. 795, but with Hairspring Compasses No. 779 in place of No. 777.
Per set, ... $24 50

No. 795L. Containing the same as No. 795, but with 4¼ in. Bows, Nos. 751A, 751B, 751C, in place of Nos. 750A, 750B, 750C.
Per set, ... $25 00

For description of Instruments, see pages 52-55

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES

Each Instrument stamped E. D. Co. or ℞.

No. 796.

No. 796. Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle.

727 " " 5½ " " "

752 Steel Spring Bow Dividers, 3¾ in., metal handle.

753 " " " Pencil, 3¾ " " "

754 " " " Pen, 3¾ " " "

769 Hairspring Dividers, 5¾ in., with replaceable steel points.

777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.

782A Combination Key and Lead Box.

782B Center Tack, ⅜ in. diameter.

782D Metal Handle, 3 in., with four needle points.

Per set, ... $26 00

No. 796H. Containing the same as No. 796, but with Hairspring Compasses No. 779 in place of No. 777.

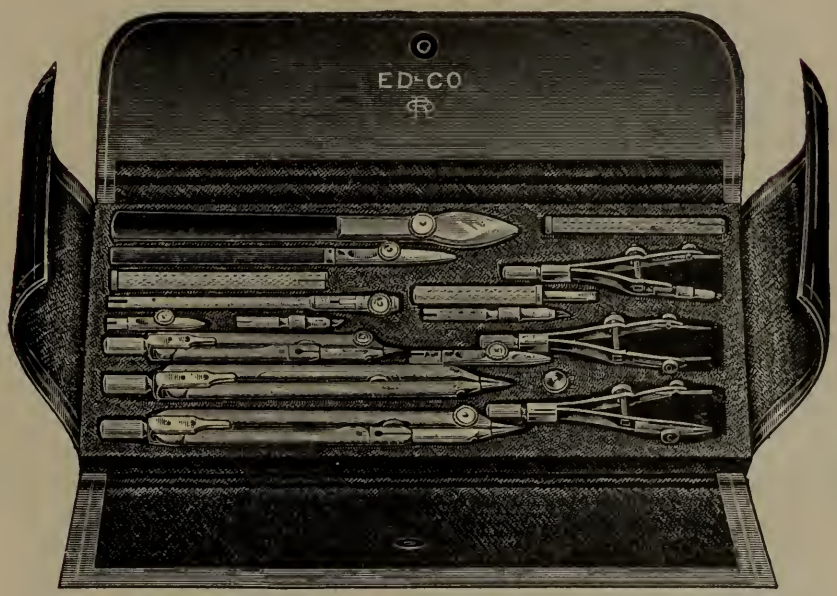
Per set, ... $27 00

No. 796L Containing the same as No. 796, but with Bows Nos. 756, 757, 758 in place of Nos. 752, 753, 754. Per set, . . $26 00

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES

Each Instrument stamped E. D. Co. or ℞.



No. 797.

No. 797. Cont'g:

No. 726 Ruling Pen, 5 in., metal handle.
740 Swedish Ruling Pen, 6 in., flat ebony handle.
746 Steel Spring Bow Dividers, 3½ in., metal handle.
747 " " " Pencil, 3½ " " "
748 " " " Pen, 3½ " " "
769 Hairspring Dividers, 5¾ in., with replaceable steel points.
775 Compasses, 4 in., with replaceable needle points, pen and pencil points, and straightening device.
777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.
782A Combination Key and Lead Box.
782B Center Tack, ⅜ in., diameter.
782C Metal Handle, 2½ in., with four needle points.
782D. " " 3 " " " " " "

Per set, ... $29 00

No. 797H. Containing the same as No. 797, but with Hairspring Compasses No. 779 in place of No. 777.

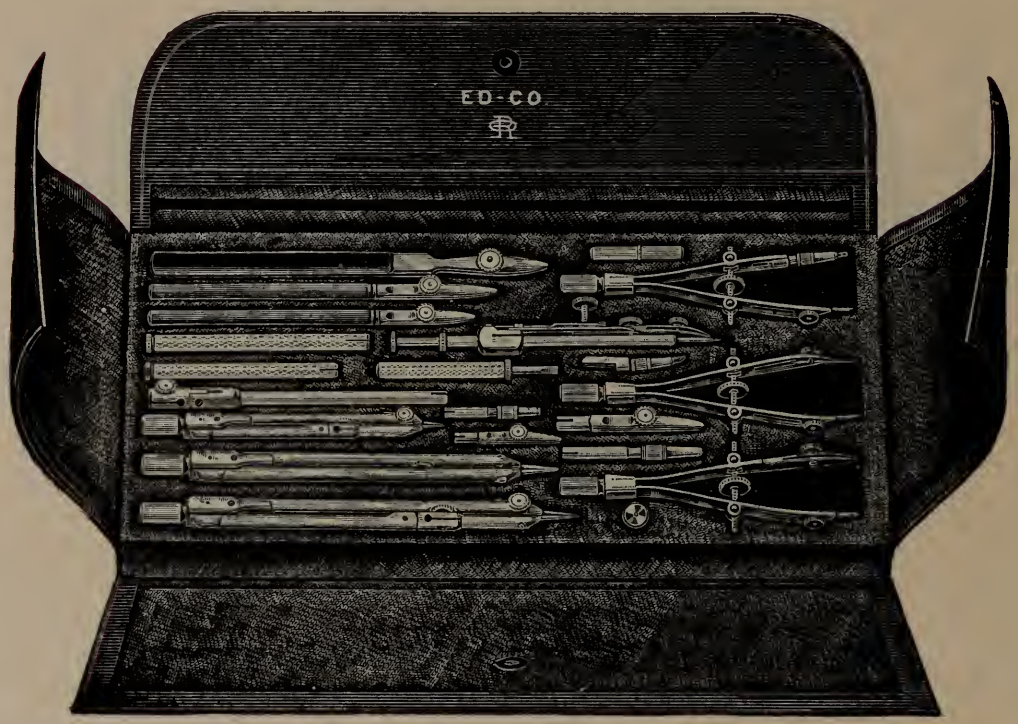
Per set, ... $30 00

For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES

Each Instrument stamped E. D. Co. or ℞.



No. 797K.

No. 797K. Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle.
726 " " 5 " " "
739 Swedish Ruling Pen, 6 in., flat ebony handle.
752 Steel Spring Bow Dividers, 3¾ in., metal handle.
753 " " " Pencil, 3¾ " " "
754 " " " Pen, 3¾ " " "
761 Self-Adjusting Spring Bow Pen and Pencil Point, 4½ in.
769 Hairspring Dividers, 5¾ in., with replaceable steel points.
775 Compasses, 4 in., with replaceable needle points, pen and pencil points and straightening device.
777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.
782A Combination Key and Lead Box.
782B Center Tack, ⅜ in., diameter.
782C Metal Handle, 2½ in., with four needle points.
782D " " 3 " " " " " "
Per set, ... $38 00

No. 797L. Containing the same as No. 797K, but with Hairspring Compasses No. 779 in place of No. 777.
Per set, ... $39 00

For description of Instruments, see pages 52-55.

RICHTER'S INSTRUMENTS OF PRECISION *Highest Grade*

IN CASES. Each Instrument stamped E. D. Co. or ℞.

No. 797N.

No. 797N. In fine polished hardwood case, with lock and tray—Cont'g:

No. 725 Ruling Pen, 4½ in., metal handle.
727 " " 5½ " " "
736 Railroad Pen, 5¼ in., " "
740 Swedish Ruling Pen, 6 in., flat ebony handle.
743 Pricker, 2⅜ in.
745 Dotting Instrument with three wheels.
745½ Circle Dotting Instrument with three wheels.
752 Steel Spring Bow Dividers, 3¾ in., metal handle.
753 " " " Pencil, 3¾ " " "
754 " " " Pen, 3¾ " " "
761 Self-Adjusting Spring Bow Pen and Pencil Point, 4½ in.
769 Hairspring Dividers, 5¾ in., with replaceable steel points.
775 Compasses, 4 in., with replaceable needle points, pen and pencil points and straightening device.
777 Compasses, 6 in., with replaceable needle points, pen and pencil points, lengthening bar and straightening device.
782A Combination Key and Lead Box.
782B 2 Center Tacks, ⅜ in., diameter.
782C Metal Handle, 2½ in., with four needle points.
782D " " 3 " " " " " "
783 Beam Compasses.
787 Proportional Dividers, 7¼ in.

Per set, ... $75 00

Any other assortments fitted up to order at short notice.

For description of Instruments, see pages 52-55.

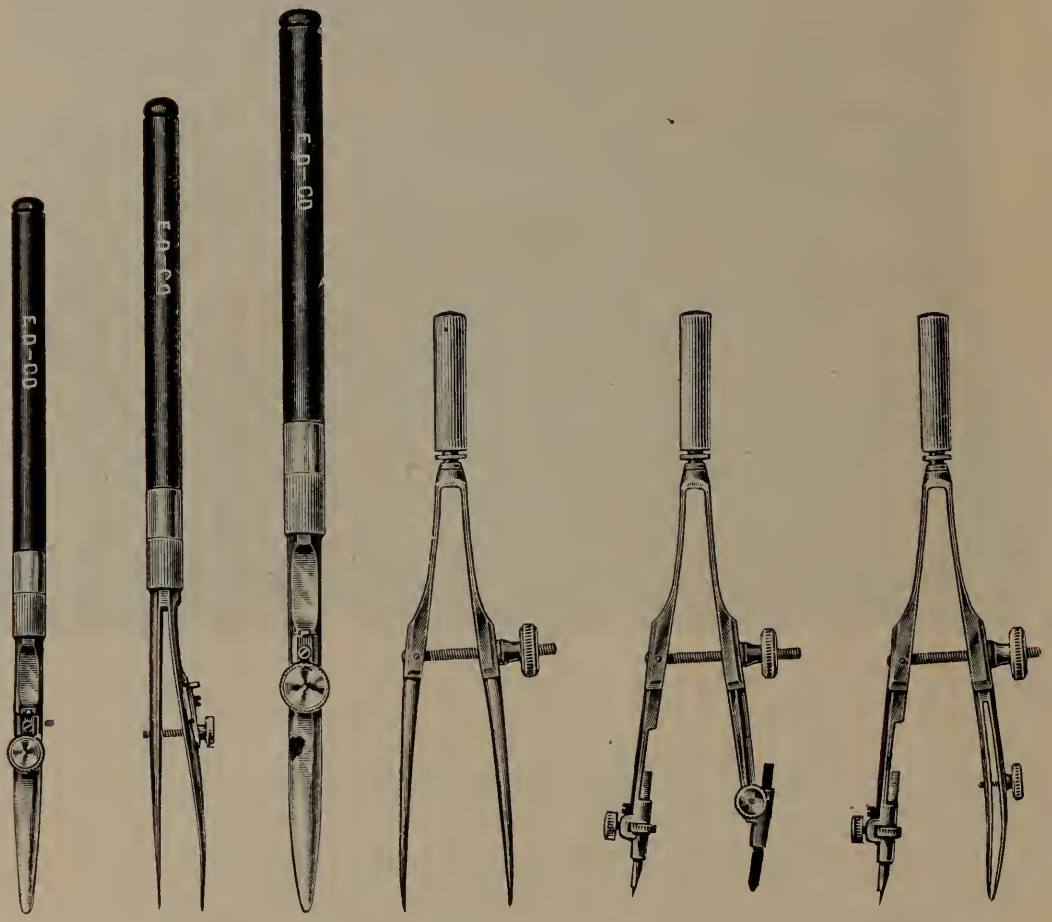
PREMIER INSTRUMENTS

High Grade.

Of Best German Silver, Finest Steel Points and High Finish.

For description of quality, see page 55.

Illustrations ⅔ size.



No.798A. 798B. 798C. 798D. 798E. 798F.

No. 798A.	Ruling Pen, 4¼ in., with slide-catch, ebony handle,	Each,	$0 90
798B.	" " 5 " " " " " "	"	1 00
798C.	" " 5½ " " " " " "	"	1 15
798D.	Steel Spring Bow Dividers, 3½ in., metal handle,	"	1 40
798E.	" " " Pencil, 3½ " " " . .	"	1 75
798F.	" " " Pen, 3½ " " " . .	"	1 75

By means of slide on upper blade, Ruling Pens Nos. 798A-798C may be opened for cleaning and closed again without changing adjustment for width of lines. These Pens differ slightly from our Slide-Catch Ruling Pens listed under Nos. 510-512, and are made by us to meet the demand for an improved pen at a moderate price.

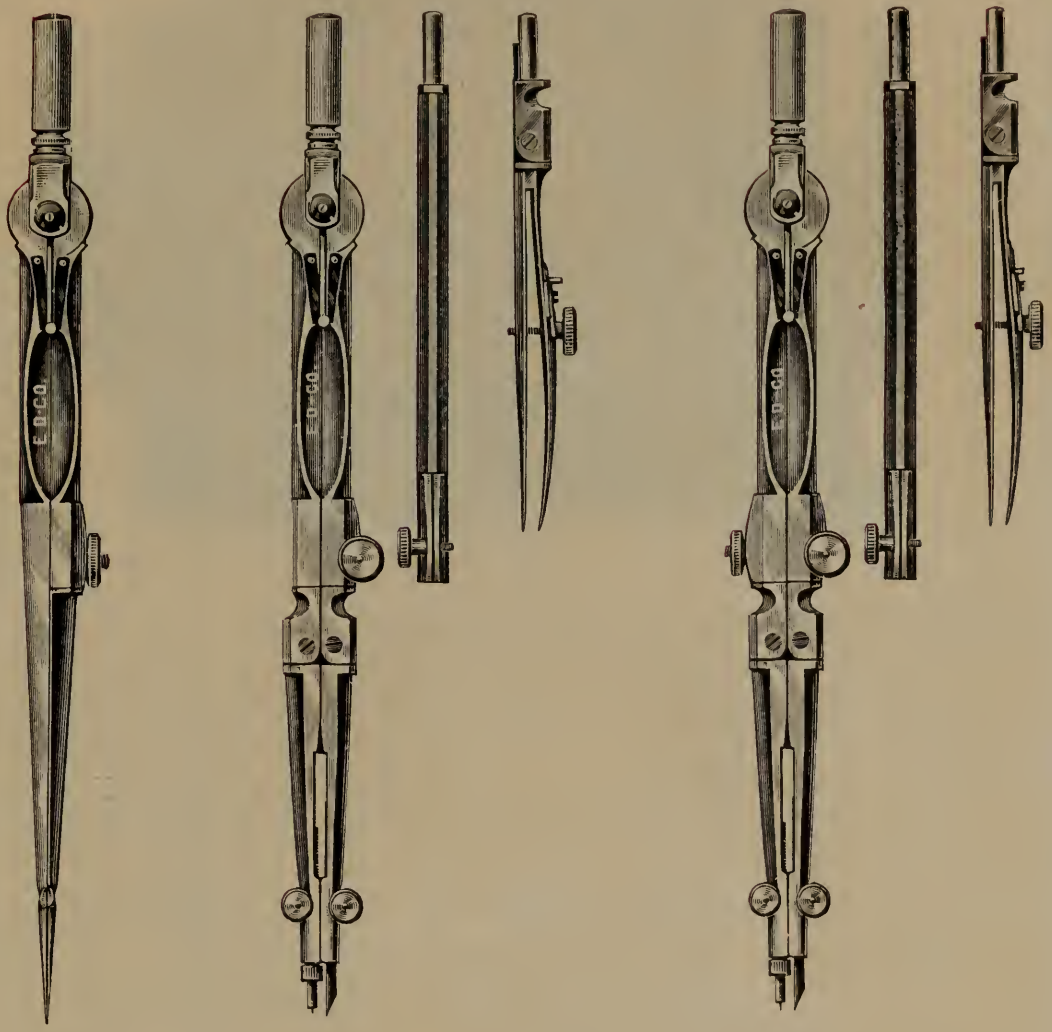
Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points.

PREMIER INSTRUMENTS

High Grade

Of Best German Silver, Finest Steel Points and High Finish.

Illustrations $\frac{2}{3}$ size.



No. 798K. 798L. 798M.

No. 798K. Hairspring Dividers, 6 in., with straightening device, Each, $3 25

798L. Compasses, 6 in., with fixed needle point, slide-catch pen, pencil point, lengthening bar and straightening device, ... " 6 00

798M. Compasses, 6 in., Hairspring, with fixed needle point, slide-catch pen, pencil point, lengthening bar and straightening device, ... " 6 75

Compasses fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

For description of Instruments, see page 55.

PREMIER INSTRUMENTS IN CASES

High Grade

Of Best German Silver, Finest Steel Points and High Finish.

No. 799A.

No. 799A. Pocket Book Case, silk velvet lined. Cont'g:

No. 798A Ruling Pen, 4¼ in., with slide catch and ebony handle.
798C Ruling Pen, 5½ in., with slide catch and ebony handle.
798D Steel Spring Bow Dividers, 3½ in., metal handle.
798E " " " Pencil, 3½ " " "
798F " " " Pen, 3½ " " "
798K Hairspring Dividers, 6 in., with straightening device.
798L Compasses, 6 in., with fixed needle point, slide-catch pen, pencil point, lengthening bar and straightening device.

Box with Leads. Per set, ... $18 00

No. 799B. Containing same assortment as No. 799A, but in Pocket Book Case, **chamois lined.**

Per set, ... $18 50

No. 799C. Containing same assortment as No. 799A, but with Hairspring Compasses No. 798M in place of No. 798L, in Pocket Book Case, silk velvet lined.

Per set, ... $18 75

PREMIER INSTRUMENTS IN CASES

High Grade

Of Best German Silver, Finest Steel Points and High Finish.

No. 799D.

No. 799D. Pocket Book Case, silk velvet lined, cont'g:

No. 798B Ruling Pen, 5 in., with slide-catch and ebony handle.

837 Swedish Detail Pen, 6 in., ebony handle.

798D Steel Spring Bow Dividers, 3½ in., metal handle.

798E " " " Pencil, 3½ " " "

798F " " " Pen, 3½ " " "

798K Hairspring Dividers, 6 in., with straightening device.

798M Compasses, 6 in., hairspring, with fixed needle point, slide-catch pen, pencil point, lengthening bar and straightening device.

Box with Leads. Per set, ... $18 75

No. 799E. Containing the same assortment as No. 799D, but having Compasses No. 798L in place of No. 798M.

Per set, ... $18 00

For description of Instruments, see page 55.

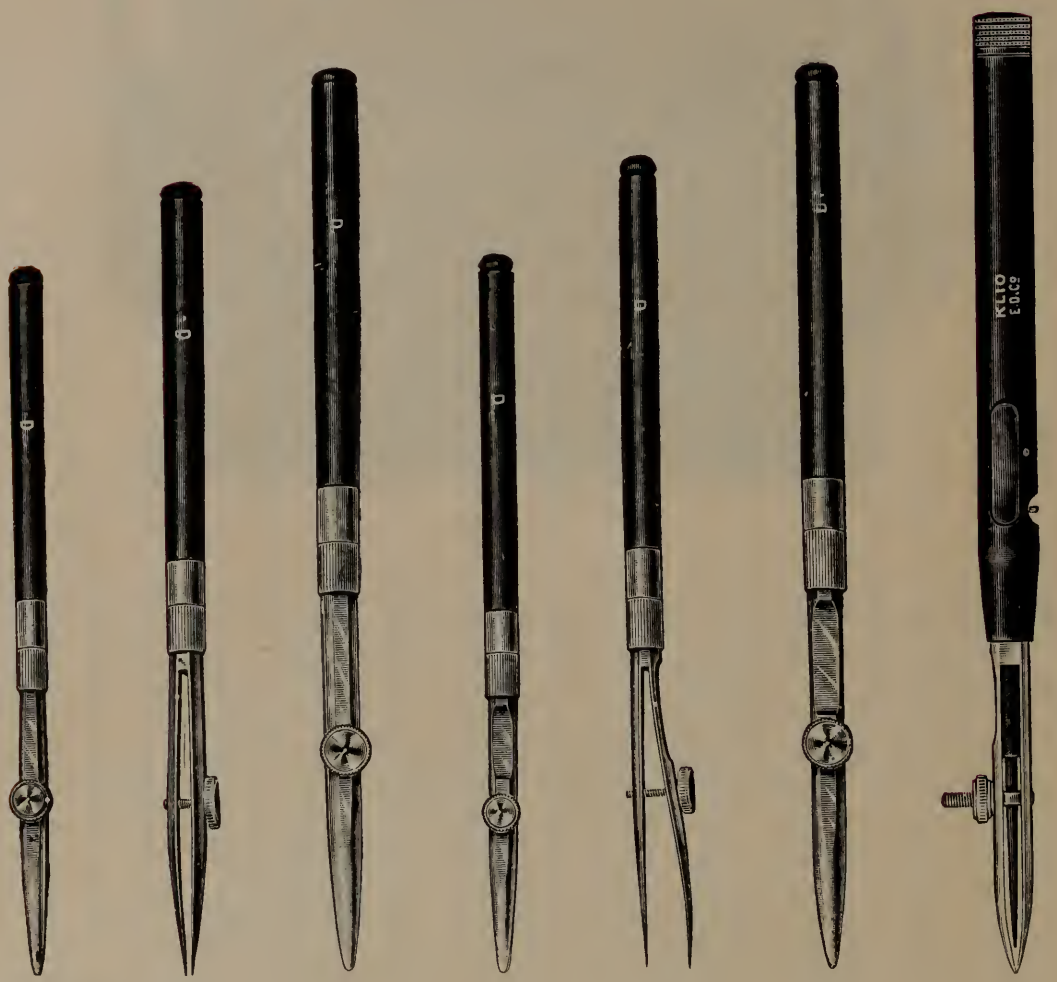
SUPERIOR GERMAN INSTRUMENTS

The Second Best Grade of Instruments.

Of Best German Silver, Steel Points and High Finish.

For description of quality, see page 55.

Illustrations ⅔ size.



No. 800. 801. 802. 806. 807. 808. 813.

No. 800.	Ruling Pen, 4¼ in., ebony handle, ...	Each,	$0 40
801.	" " 5 " " "	"	45
802.	" " 5½ " " "	"	48
806.	" " 4¼ " " " upper blade with spring	"	60
807.	" " 5 " " " " " " " "	"	66
808.	" " 5½ " " " " " " " "	"	72
813.	Klio Fountain Ruling Pen, 6 in., ...	"	2 50

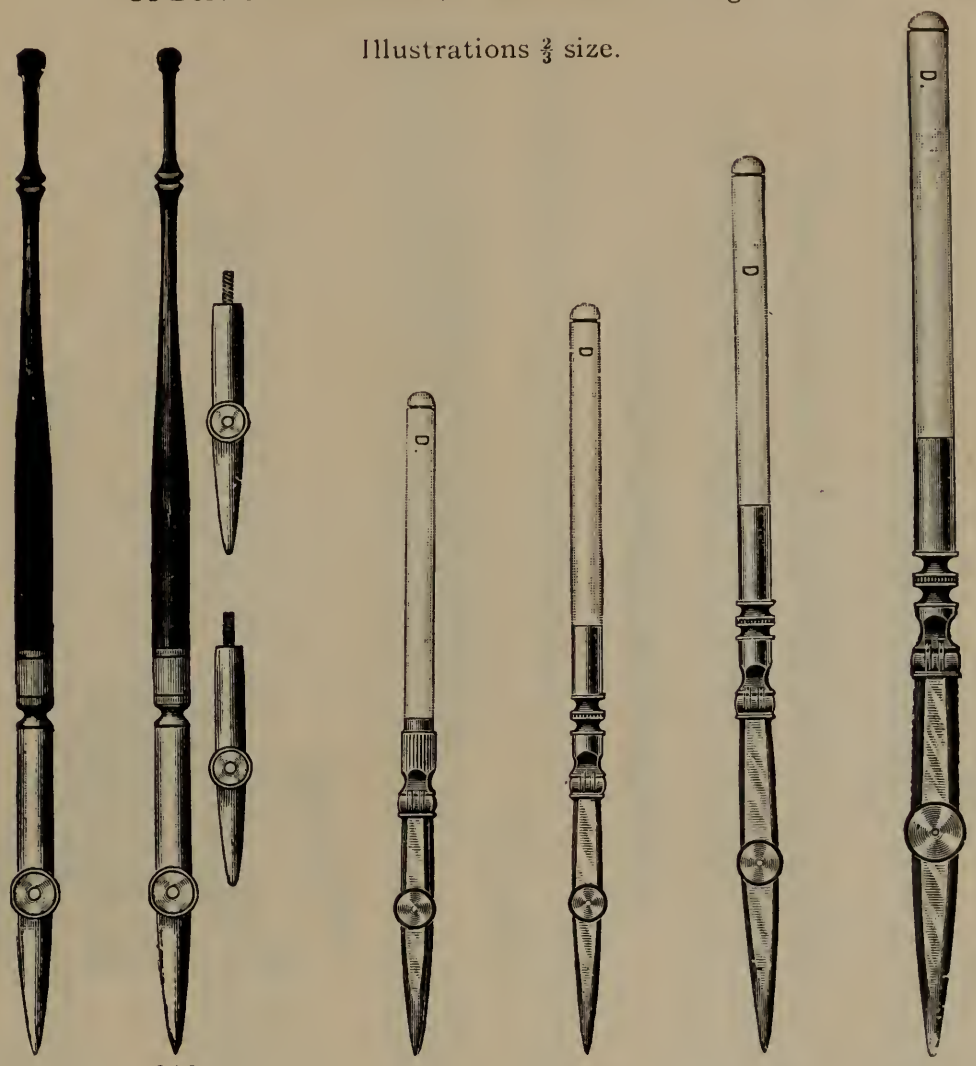
The Klio Fountain Pen is so constructed that the ink will flow quickly and will not blot or clog. The thumb pad which controls the feed, is always in position to bring out a new supply of ink without interrupting the work.

Pens carefully dressed and sharpened, each 20 to 25 cents.

SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.

Illustrations ⅔ size.



No. 815. 816. 818. 819. 820. 821.

No. 815.	Hatching Pen, 6 in., extra fine, with pushing screw .	Each,	$0 84
816.	" " 6 " " " " " " 3 pens to handle, ...	"	1 65
818.	Ruling Pen, 4 in., ivory handle, joint, ...	"	84
819.	" " 4¾ " " " with pin and joint,	"	93
820.	" " 5½ " " " " " " "	"	1 00
821.	" " 6½ " " " " " " "	"	1 10
822.	" " 5½ " " " " " " " with German silver blades, for colored inks	"	1 00

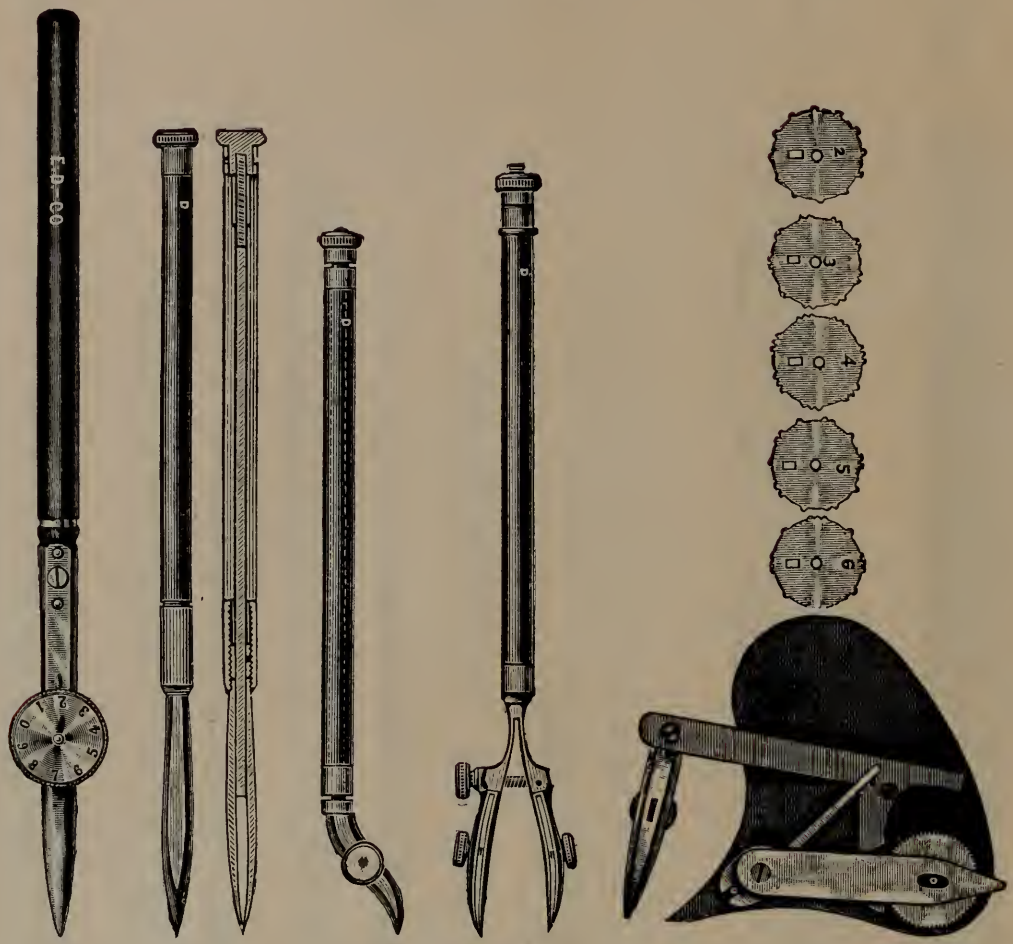
If desired, we furnish aluminum handles in place of ivory handles for Nos. 818-821 at 10 cents each additional.

Pens carefully dressed and sharpened, each 20 to 25 cents.

SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.

Illustrations ⅔ size.



No. 825. 830. 832. 834. 835.

No. 825. Ruling Pen, 5½ in., with graduated thumbscrew, . Each, $1 80

For setting blades to any desired width by the numbers on the screw, when lines of certain even thickness are wanted.

830. Ruling Pen, 5¼ in., which opens and closes by turning thumbscrew at upper end of handle, ... " 1 50

832. Curve Pen, 4¾ in., blades fastened to a rod in a hollow handle, with screw at upper end, to set pen firm or loose to follow smallest curve with precision, . . " 1 50

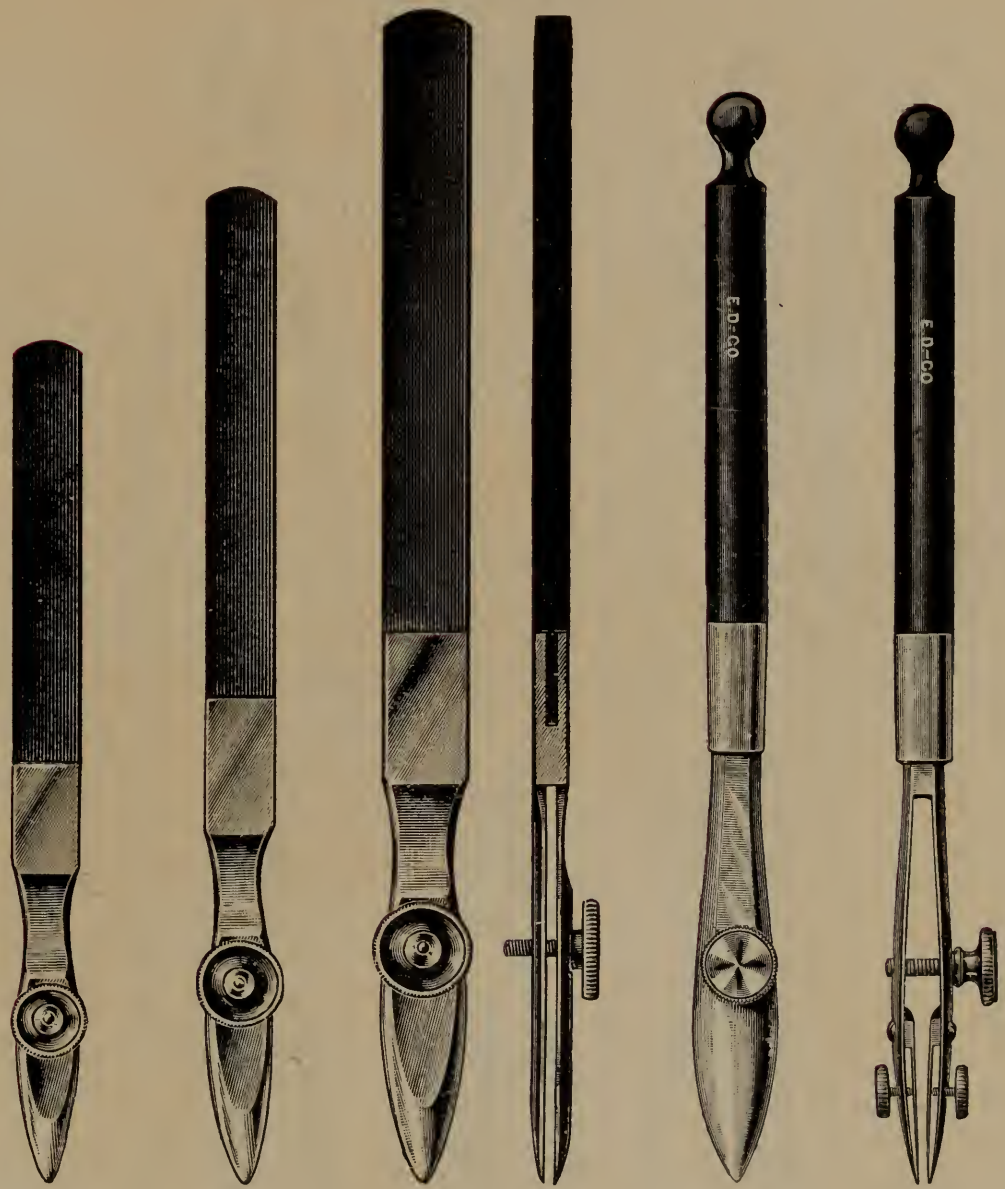
834. Railroad Pen, 5¼ in. The pens are fastened to a rod in a hollow handle, with screw at upper end to set pens firm for straight lines, or loose to follow curved lines, " 4 25

835. Dotting Instrument, with six wheels in case, . . " 4 50

By throwing back the spring the wheels of different patterns are inserted. The wheel is rolled on the edge of a T square or straight edge and causes the pen by means of a ratchet wheel to move up and down. Dotting instruments for circles, see No. 922.

SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.
Illustrations ⅔ size.



No. 836. 837. 838. 843. 845.

No. 836. Swedish Detail Ruling Pen, 5 in., ebony handle, upper blade with spring, for long lines, ... Each, $0 90
837. Swedish Detail Ruling Pen, 6 in., ebony handle, upper blade with spring, for long lines, ... " 1 05
838. Swedish Detail Ruling Pen, 7 in., ebony handle, upper blade with spring, for long lines, ... " 1 20
843. Detail Pen, 6¼ in., round ebony handle, ... " 1 00
845. " " 6½ " " " " for double lines, " 2 00

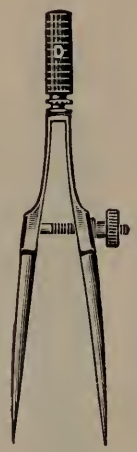
These Pens are adapted for drawing long and heavy lines, and being made to hold much ink, do not require very frequent filling.

Pens carefully dressed and sharpened, each 20 to 25 cents.

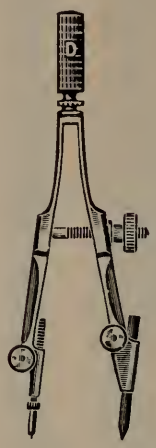
SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.

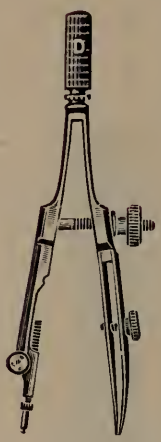
Illustrations ⅔ size.



No. 850.

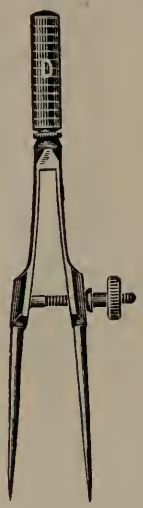


851.

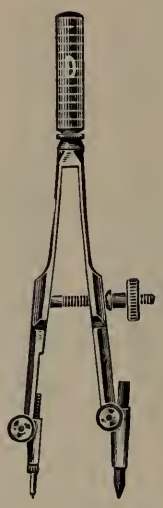


852.

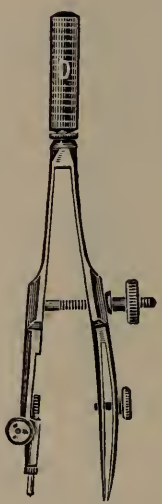
No. 850.	Minute Steel Spring Bow Dividers, 2½ in., metal handle, Each,	$1 00
851.	" " " " Pencil, 2½ " " " " "	1 35
852.	" " " " Pen, 2½ " " " " "	1 35
853.	Set of Bows, Nos. 850, 851, 852, in morocco case, . Per set,	4 35



No. 855.



856.



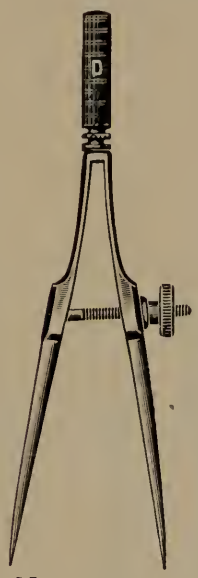
857.

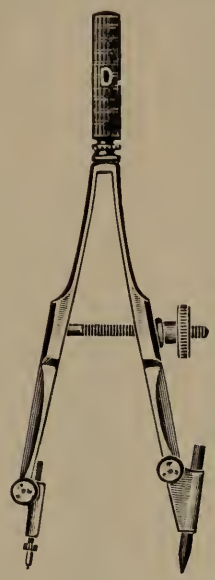
No. 855.	Steel Spring Bow Dividers, 3 in., metal handle, . . Each,	$1 05
856.	" " " Pencil, 3 " " " . . "	1 40
857.	" " " Pen, 3 " " " . . "	1 40
858.	Set of Bows, Nos. 855, 856, 857, in morocco case, . Per set,	4 60

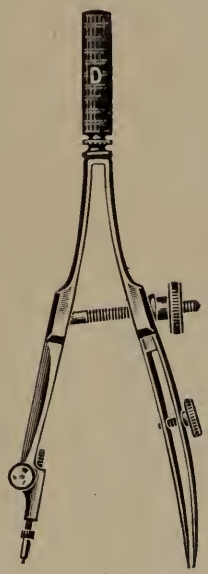
Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

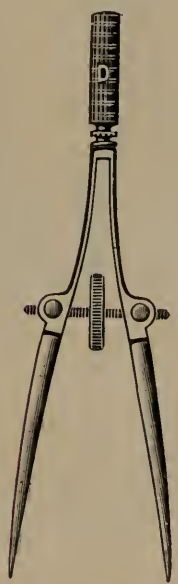
Of Best German Silver, Steel Points and High Finish.
Illustrations ⅔ size.

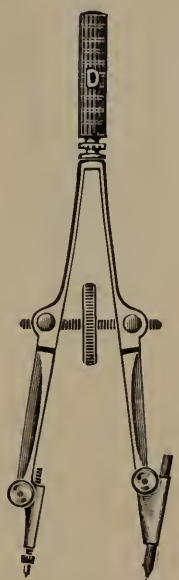

No. 860.

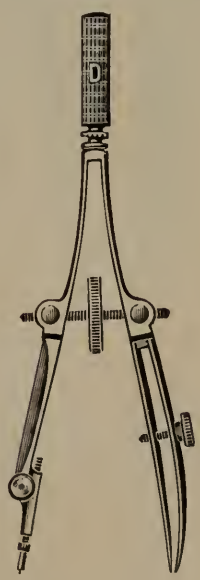

861.


862.

No. 860.	Steel Spring Bow Dividers, 3½ in., metal handle, . .	Each, $1 08
861.	" " " Pencil, 3½ " " " . .	" 1 45
862.	" " " Pen, 3½ " " " . .	" 1 45
863.	Set of Bows, Nos. 860, 861, 862, in morocco case, . .	Per set, 4 65


No. 864.


865.


866.

No. 864.	Steel Spring Bow Dividers, 3½ in., metal handle, .	Each, $1 65
865.	" " " Pencil, 3½ " " " .	" 1 95
866.	" " " Pen, 3½ " " " .	" 1 95
867.	Set of Bows, Nos. 864, 865, 866, in morocco case, .	Per set, 6 60

These Bows have a screw on a right-and-left thread, which holds the points firmly in any position. Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points.

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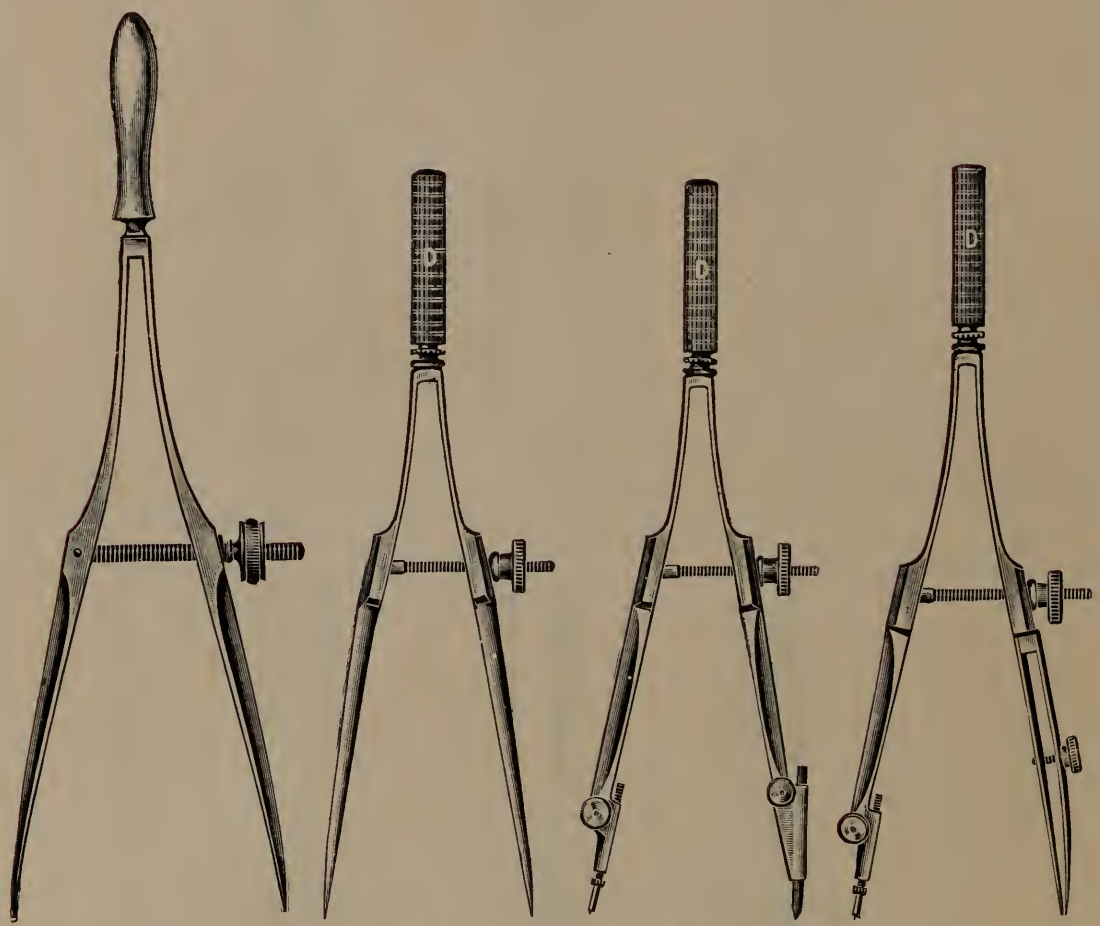
Of Best German Silver, Steel Points and High Finish.

Illustrations ⅔ size.



No. 871. 872. 873. 874.

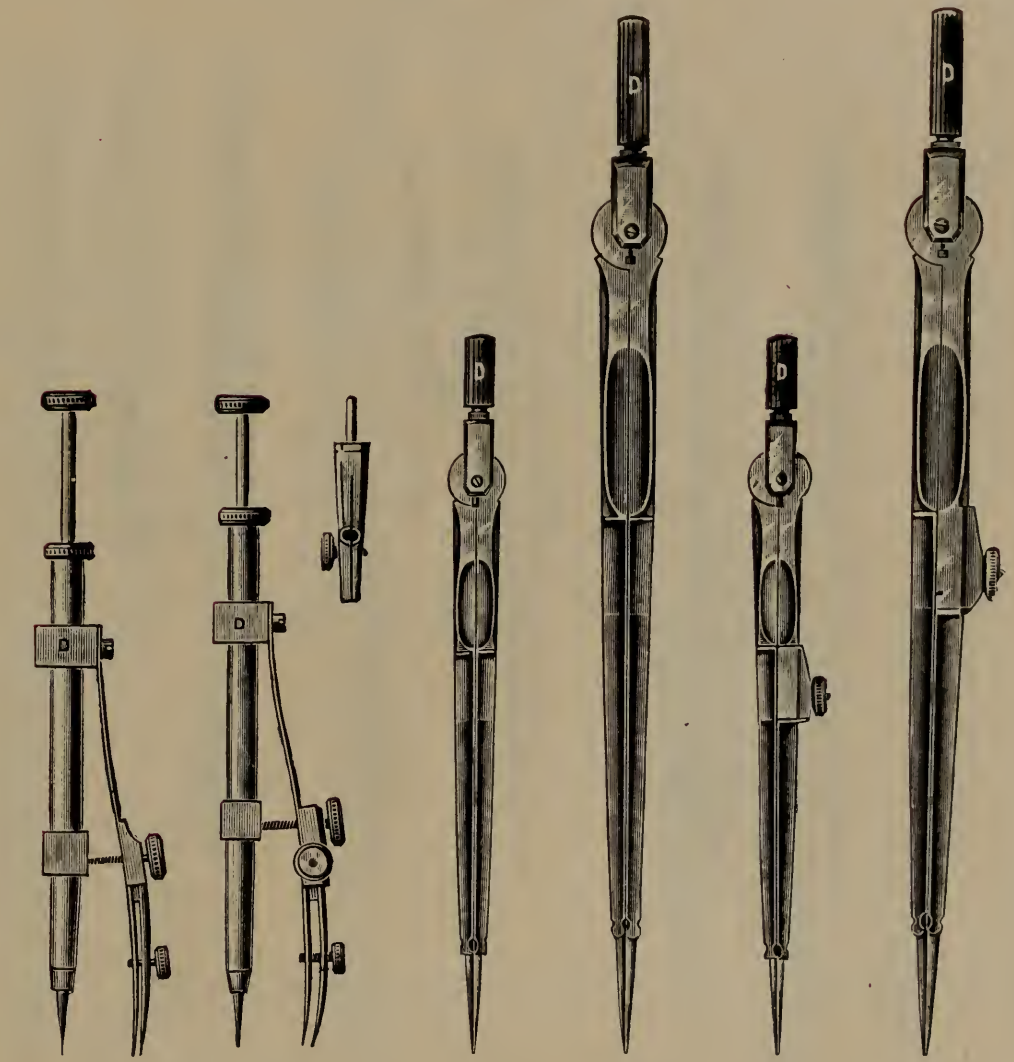
No. 871.	Large Steel Spring Dividers, 5¾ in., white handle, .	Each,	$2 25
872.	Steel Spring Bow Dividers, 4¾ in., metal handle, . .	"	1 85
873.	" " " Pencil, 4¾ " " " . .	"	2 10
874.	" " " Pen, 4¾ " " " . .	"	2 10
875.	Set of Bows, Nos. 872, 873, 874, in morocco case, .	Per set,	6 90

Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points.

SUPERIOR GERMAN INSTRUMENTS

Second Best Grade

Of Best German Silver, Steel Points and High Finish.
Illustrations, ⅔ size.



No. 883. 884. 897. 898. 902. 903.

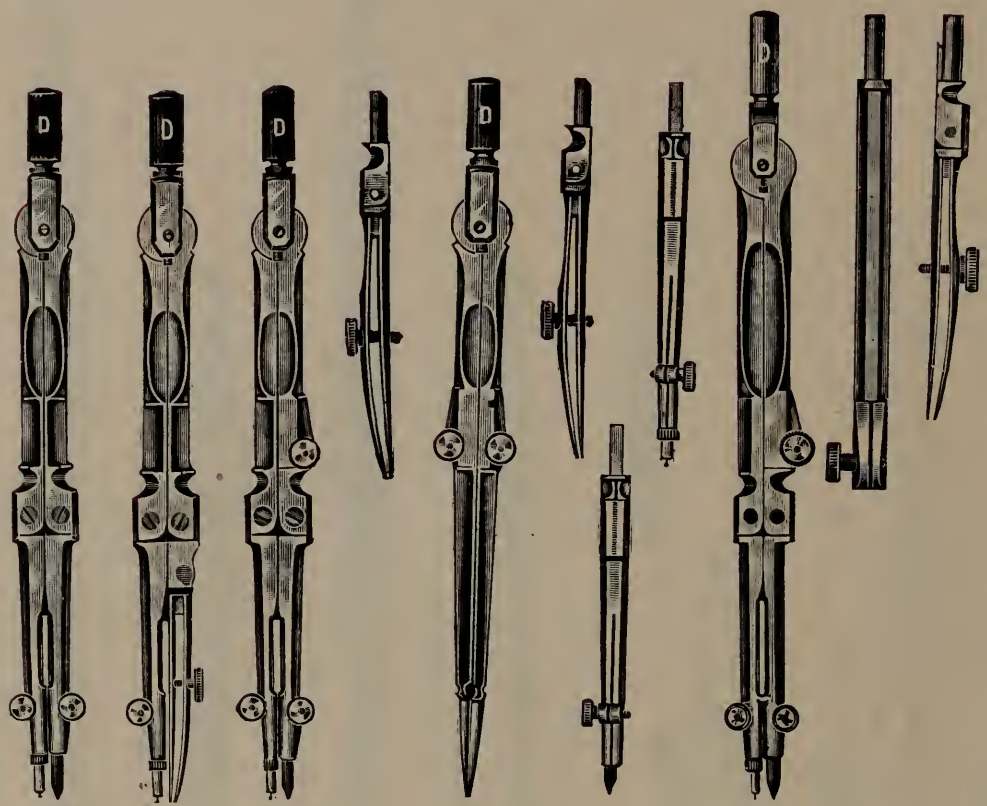
No. 883.	Spring Bow Pen, self-adjusting,		Each,	$1 80
884.	" " " " "	with pencil point,	"	3 00
897.	Plain Dividers,	4¼ in., pivot joint,	"	1 35
898.	" "	6 " " "	"	1 50
899.	" "	7 " " "	"	1 80
902.	Hairspring Dividers,	4¼ " " "	"	1 90
902½.	" "	4¾ " " "	"	2 10
903.	" "	6 " " "	"	2 25
903S.	" "	6 " " "	with straightening device, "	2 45
904.	" "	7 " " "	"	2 75

SUPERIOR GERMAN INSTRUMENTS

Second Best Grade

Of Best German Silver, Steel Points and High Finish.

Illustrations ⅔ size.



No. 906. 907. 908. 910. 911.

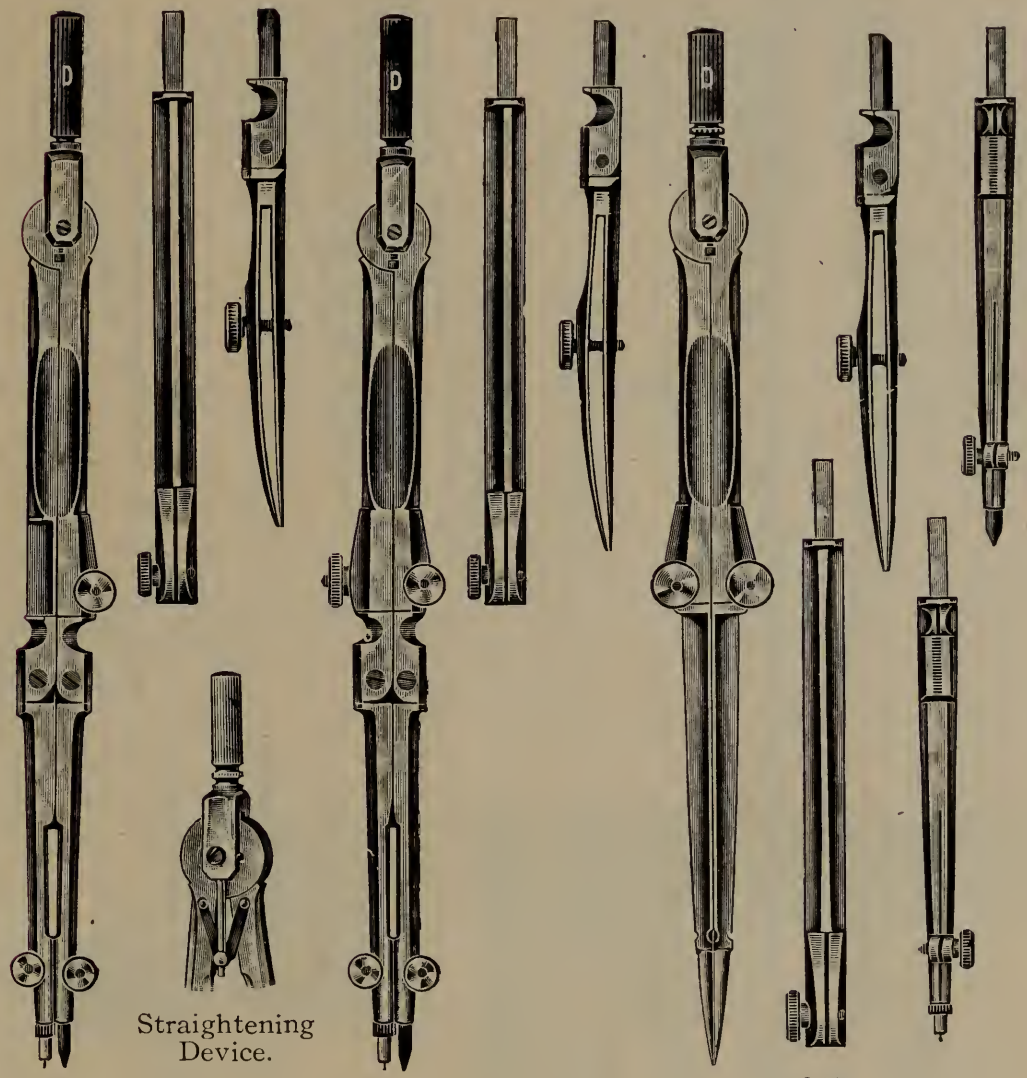
No. 906.	Compasses, 4¼ in., with fixed needle and pencil point, pivot joint, ...	Each,	$2 75
907.	Compasses, 4¼ in., with fixed needle and pen point, pivot joint, ...	"	2 75
908.	Compasses, 4¼ in., with fixed needle point, pen and pencil point, pivot joint, ...	"	3 60
910.	Compasses, 4¼ in., with 2 steel points, pen, pencil and needle point, pivot joint, ...	"	4 20
911.	Compasses, 5 in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint, ...	"	4 20

Above Compasses fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.

Illustrations ⅔ size.



Straightening Device.

No. 913. 914. 915.

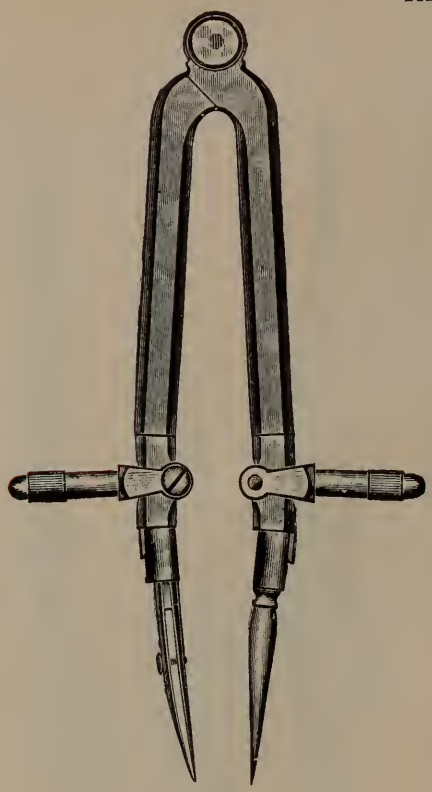
No. 913.	Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint, ...	Each,	$4 35
913S.	Compasses like No. 913, but with straightening device,	"	4 55
914.	Compasses, 6 in., Hairspring, with fixed needle point, pen, pencil point and lengthening bar, pivot joint,	"	5 00
914S.	Compasses like No. 914, but with straightening device,	"	5 20
915.	Compasses, 6 in., with 2 steel points, pen, pencil and needle point and lengthening bar, pivot joint, . .	"	5 00

Above Compasses fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

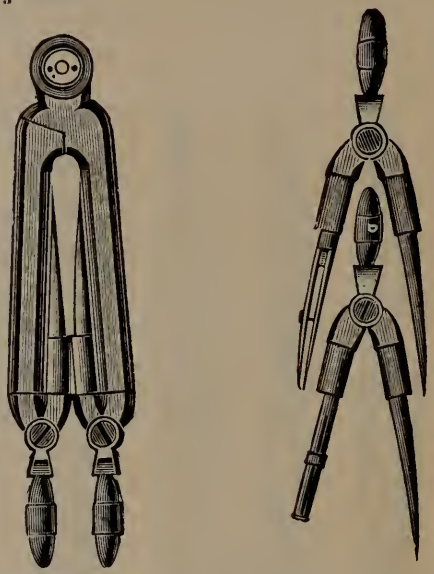
SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.

Illustrations ⅔ size.

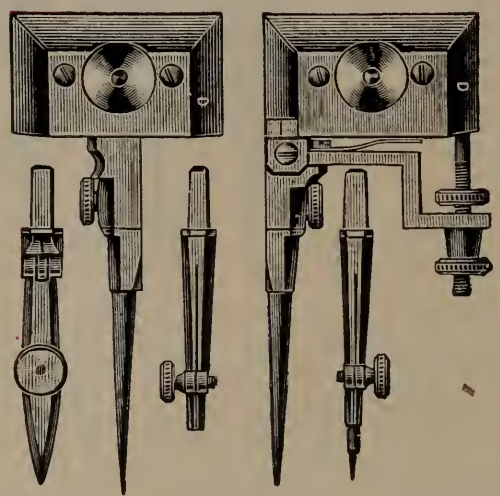


No. 918.

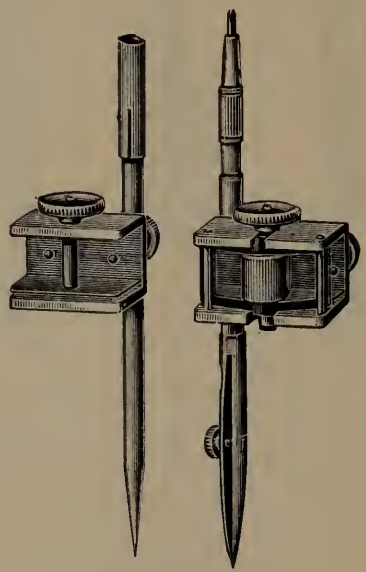


No. 918, folded. 918, points withdrawn.

No. 918. Pillar Pocket Compasses, with two steel points, pen and pencil points, which can be withdrawn from compasses to be used separately as bow pencil and bow pen, respectively; in case, ... Each, $8 70



No. 920.



920 E.

No. 920. Beam Compasses, to fit on any straight edge, with two steel points, pencil, pen and needle points, . . . Each, $6 90

920C. Beam Compasses, No. 920 in morocco pocket case, . . " 8 00

920E. Beam Compasses, with steel point, pen and pencil point, adjusted by means of a milled roller, ... " 6 80

920F. Beam Compasses, No. 920E in morocco pocket case, . " 8 00

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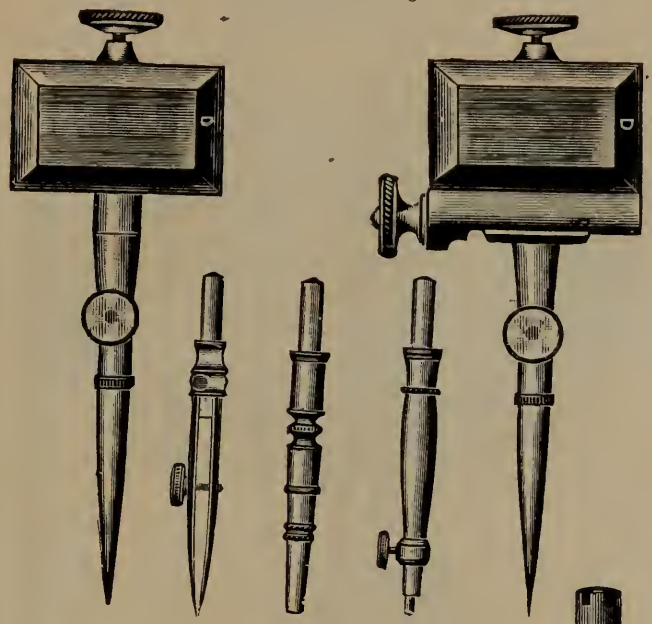
Of Best German Silver, Steel Points and High Finish.
Illustrations ⅔ size.

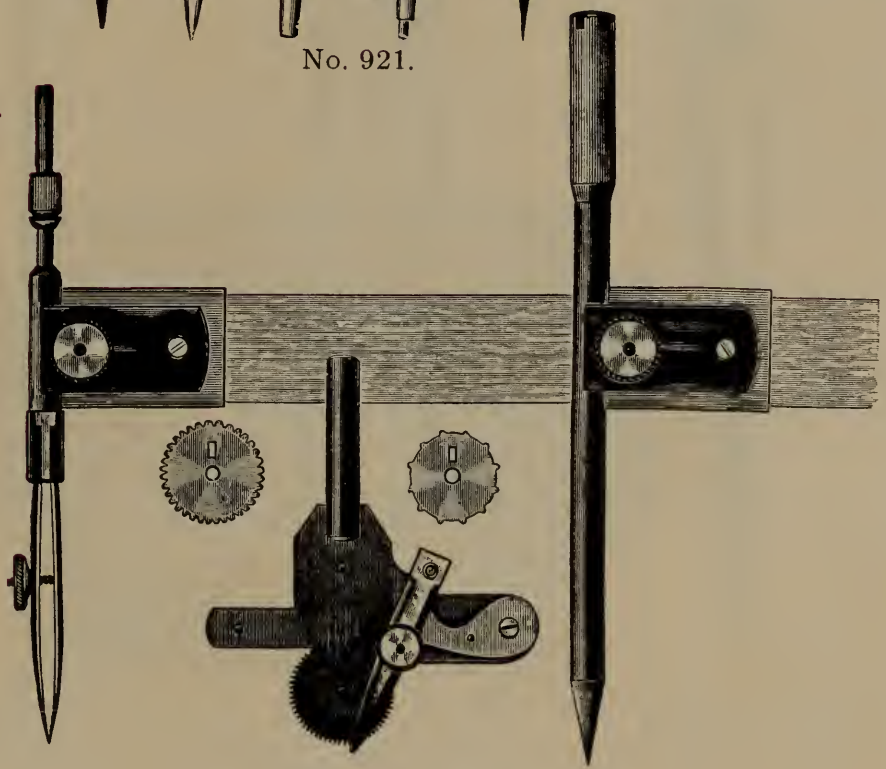


No. 921. Beam Compasses, with two steel points, pen, pencil and needle point.
Each, . . $7 40

No. 921C. Beam Compasses, No. 921, in morocco pocket case.
Each, . . $8 50

No. 921.

Pencil point.



Pen Point.

No. 922.

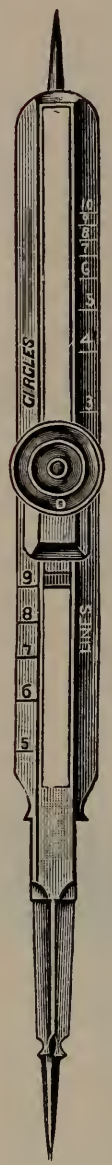
No. 922. Beam Compasses, with pen and pencil points, and dotting instrument with three wheels of different patterns similar to No. 835. The dotting instrument can be used separately like No. 835 or in connection with Beam Compasses to draw dotted circles. Complete in case, ... Each, $9 90

For Beam Compass Bars see No. 2119.

SUPERIOR GERMAN INSTRUMENTS *Second Best Grade*

Of Best German Silver, Steel Points and High Finish.

Illustrations $\frac{2}{3}$ size.



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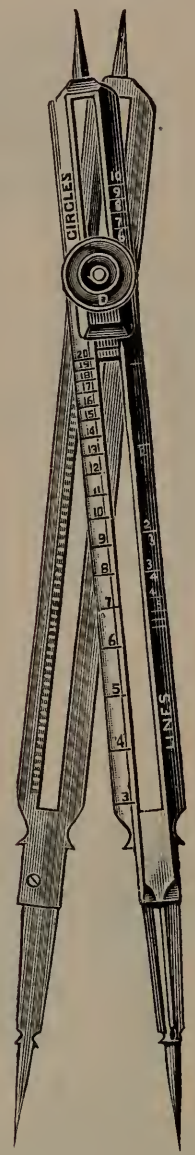
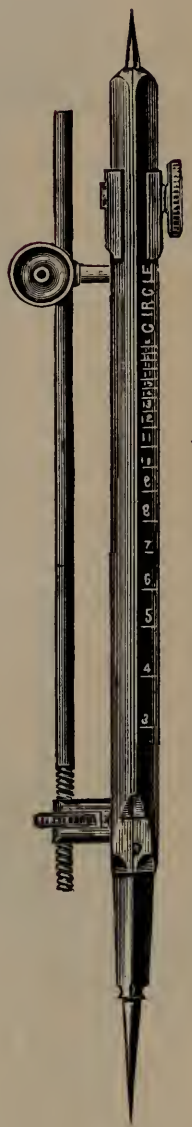


926.



928.

No. 924.	Proportional Dividers, $7\frac{1}{4}$ in., for lines and circles, in case,	Each,	$ 7 00
925.	Proportional Dividers, $9\frac{1}{4}$ in., for lines and circles, in case,	"	10 20
926.	Proportional Dividers, $7\frac{1}{4}$ in., with rack movement, for lines, circles, planes and solids, in case,	"	10 20
928.	Proportional Dividers, $9\frac{1}{4}$ in., with micrometer adjustment, for lines and circles, in case,	"	13 50

Nos. 924 to 928, without cases, cost $0.75 to $1.00 less.

SUPERIOR GERMAN INSTRUMENTS

IN POCKET BOOK STYLE CASES, LINED WITH SILK VELVET.

The Second Best Grade of Instruments.

Of Best German Silver, Steel Points and High Finish.

For description of quality see page 55.

No. 930.

No. 930. Cont'g:

No. 807 Ruling Pen, 5 in., with spring and ebony handle.
857 Steel Spring Bow Pen, 3 in., metal handle.
911 Compasses, 4¾ in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint.
977 Combination Lead Box and Key.
Extra Needle Point for Compasses. Per set, . . $7 50

No. 931. Containing the same as No. 930, but including Hairspring Dividers No. 902½, 4¾ in., and without extra needle point.
Per set, ... $9 90

No. 933.

No. 933. Cont'g:

No. 806 Ruling Pen, 4¼ in., with spring and ebony handle.
807 " " 5 " " " " " " "
855 Steel Spring Bow Dividers, 3 in., metal handle.
856 " " " Pencil, 3 " " "
857 " " " Pen, 3 " " "
902½ Hairspring Dividers, 4¾ in., pivot joint.
911 Compasses, 5 in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint.
977 Combination Lead Box and Key. Per set, . . . $12 50

SUPERIOR GERMAN INSTRUMENTS IN CASES

Second Best Grade

Of Best German Silver, Steel Points and High Finish.

No. 935.

No. 935. Cont'g:

No. 806 Ruling Pen, 4¼ in., with spring and ebony handle.
820 " " 5½ " " pin and joint, ivory handle.
862 Steel Spring Bow Pen, 3½ in., metal handle.
898 Plain Dividers, 6 in., pivot joint.
913 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint.
977 Combination Lead Box and Key. Per set, . . . $9 60

No. 936.

No. 936. Cont'g:

No. 808 Ruling Pen, 5½ in., with spring and ebony handle.
861 Steel Spring Bow Pencil, 3½ in., metal handle.
862 " " " Pen, 3½ " " "
903 Hairspring Dividers, 6 in., pivot joint.
913 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint.
977 Combination Lead Box and Key. Per set, . . $11 70

SUPERIOR GERMAN INSTRUMENTS IN CASES

Second Best Grade

Of Best German Silver, Steel Points and High Finish.

No. 937.

No. 937. Cont'g:

No. 806 Ruling Pen, 4¼ in., with spring and ebony handle.

808 " " 5½ " " " " " "

860 Steel Spring Bow Dividers, 3½ in., metal handle.

861 " " " Pencil, 3½ " " "

862 " " " Pen, 3½ " " "

903 Hairspring Dividers, 6 in., pivot joint.

913 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, pivot joint.

977 Combination Lead Box and Key. Per set, . . $13 50

No. 937C. Containing same assortment as No. 937, but having center wheel bows Nos. 864, 865, 866 in place of Nos. 860, 861, 862. Per set, ... 15 00

No. 937H. Containing same assortment as No. 937, but with Hairspring Compasses No. 914 in place of No. 913. Per set, . . 14 15

No. 937S. Containing same assortment as No 937, but Compasses and Dividers with straightening device. Per set, ... 13 90

No. 937SH. Containing same assortment as No. 937H, but Compasses and Dividers with straightening device. Per set, . . . 14 55

SUPERIOR GERMAN INSTRUMENTS IN CASES

Second Best Grade

Of Best German Silver, Steel Points and High Finish.

No. 938.

No. 938. Cont'g:

No. 807 Ruling Pen, 5 in., with spring and ebony handle.
837 Detail " 6 " " " for long lines.
864 Steel Spring Bow Dividers, 3½ in., metal handle.
865 " " " Pencil, 3½ " " "
866 " " " Pen, 3½ " " "
903 Hairspring Dividers, 6 in., pivot joint.
914 Compasses, 6 in., hairspring, with fixed needle point, pen, pencil point and lengthening bar, pivot joint.

977 Combination Lead Box and Key. Per set, . . $15 00

No. 938S. Containing same assortment as No. 938, but Compasses and Dividers with straightening device. Per set, ... 15 40

No. 939. Containing same assortment as No. 938, but having Compasses No. 913 in place of No. 914. Per set, ... 14 30

No. 939S. Containing same assortment as No. 939, but Compasses and Dividers with straightening device. Per set, ... 14 70

Any other assortments in morocco cases fitted up to order at short notice.

See Empty Morocco Cases on pages 161-162.

SUPERIOR GERMAN INSTRUMENTS IN CASES

Second Best Grade

Of Best German Silver, Steel Points and High Finish.

No. 940.

No. 940. Cont'g:

No. 806 Ruling Pen, 4¼ in., with spring and ebony handle.

820 " " 5½ " with pin and joint, ivory handle.

860 Steel Spring Bow Dividers, 3½ in., metal handle.

861 " " " Pencil, 3½ " " "

862 " " " Pen, 3½ " " "

903 Hairspring Dividers, 6 in., pivot joint.

908 Compasses, 4¼ in., with fixed needle point, pen and pencil point, pivot joint.

915 Compasses, 6 in., with 2 steel points, pen, pencil and needle point, and lengthening bar, pivot joint.

977 Combination Lead Box and Key. Per set, . . $17 40

No. 941. Containing same assortment as No. 940, but with No. 808 Ruling Pen in place of No. 820, and No. 913 Compasses in place of No. 915. Per set, ... 16 50

Any other assortments in morocco cases fitted up to order at short notice.

See Empty Morocco Cases on pages 161-162.

FINE GERMAN INSTRUMENTS

The Third Best Grade of Instruments.

Of German Silver and Steel Points,

For description of quality see page 55.

Illustrations $\frac{2}{3}$ size.

No. 945. 946. 947. 950. 951. 953. 954. 956. 957.

No. 945.	Ruling Pen, $4\frac{1}{4}$ in., ebony handle, upper blade with spring,	Each,	$0 55
946.	Ruling Pen, 5 in., ebony handle, upper blade with spring,	"	60
947.	Ruling Pen, $5\frac{1}{2}$ in., ebony handle, upper blade with spring,	"	65
950.	Ruling Pen, 4 in., no joint,	"	30
951.	" " $5\frac{1}{2}$ " " "	"	35
953.	" " 4 " fine joint,	"	45
954.	" " $5\frac{1}{2}$ " " "	"	54
956.	" " 4 " " " and pin,	"	60
957.	" " $5\frac{1}{2}$ " " " " "	"	66

Aluminum handles for above pens furnished at 10 cents each additional.

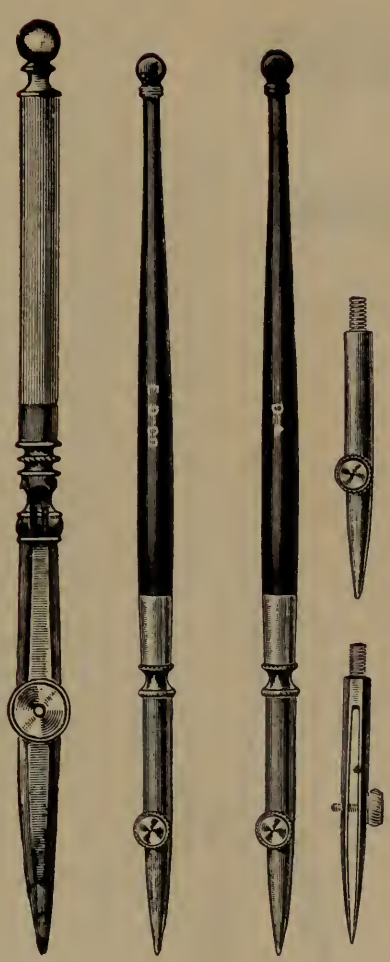
Pens carefully dressed and sharpened, each 20 to 25 cents.

FINE GERMAN INSTRUMENTS

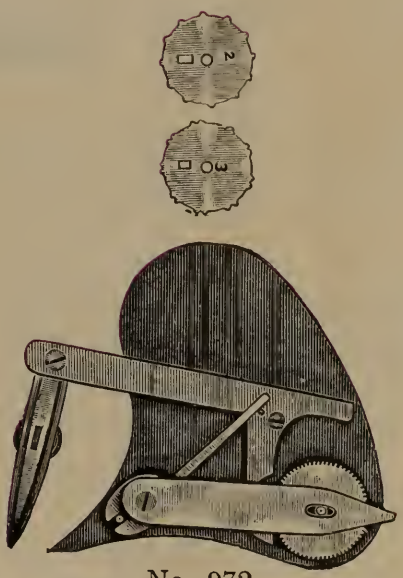
Third Best Grade

Of German Silver and Steel Points.

Illustrations $\frac{2}{3}$ size.



No. 960. 962. 963. 968.



No. 972.
(See also No. 835.)

No. 960.	Ruling Pen, 5½ in., fine joint, German silver blades,	Each,	$0 60
961.	" " 5½ " " " and pin, German silver blades,	"	72
	(Nos. 960-961 are intended for ruling with colored inks.)		
962.	Hatching Pen, 5 in., with pushing screw,	"	75
963.	" " 5 " " " " 3 pens to one handle,	"	1 50
968.	Railroad Pen, 5½ in., both pens with joint,	"	2 40
972.	Dotting Instrument, with three wheels, in case,	"	3 60

FINE GERMAN INSTRUMENTS

Third Best Grade

Of German Silver and Steel Points.

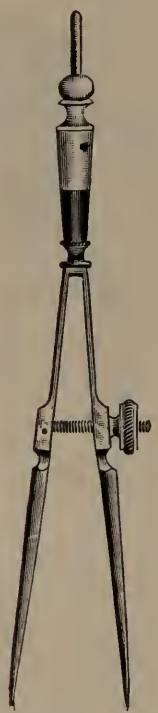
No. 975.

No. 976.

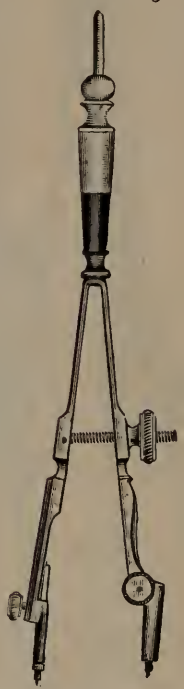
No. 977.

No. 975.	Flat Box with 4 Patent Leads for instruments, . .	Each,	$0 10
976.	Round " " 3 " " " " . .	"	10
977.	Combination Key and Lead Box, with three Patent Leads, "		25

Illustrations ⅔ size.



No. 984.



985.

986.

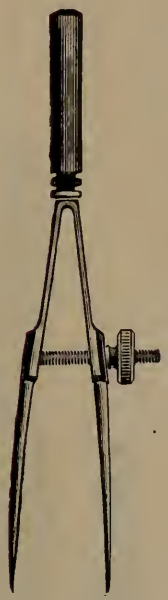
No. 984.	Steel Spring Bow Dividers, 4 in., white handle, . .	Each,	$0 90
985.	" " " Pencil, 4 " " " . .	"	1 15
986.	" " " Pen, 4 " " " . .	"	1 15
987.	Set of Bows, Nos. 984, 985, 986, in case, ...	Per set,	3 80

Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points. Patented Dec. 26, 1899.

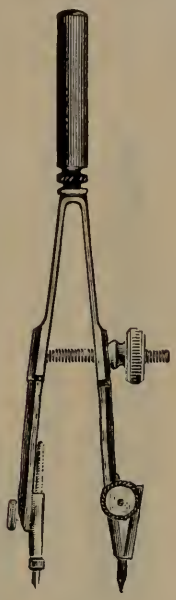
FINE GERMAN INSTRUMENTS

Third Best Grade

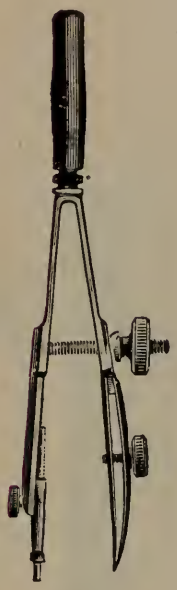
Of German Silver and Steel Points.
Illustrations ⅔ size.



No. 988.

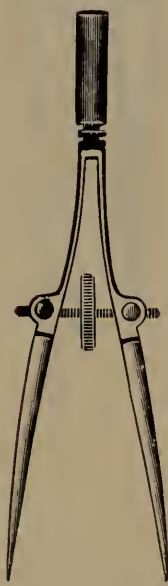


989.



990.

No. 988.	Steel Spring Bow Dividers, 3½ in., metal handle, . .	Each,	$0 90
989.	" " " Pencil, 3½ " " " . .	"	1 15
990.	" " " Pen, 3½ " " " . .	"	1 15
991.	Set of Bows, Nos. 988, 989, 990, in case, ...	Per set,	3 80



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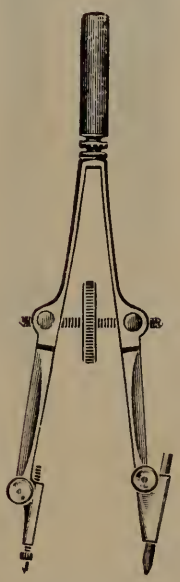
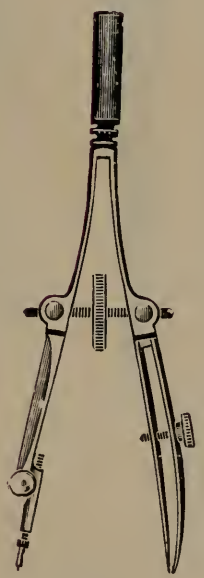


994.



995.

No. 993.	Steel Spring Bow Dividers, 3½ in., metal handle, . .	Each,	$1 25
994.	" " " Pencil, 3½ " " " . .	"	1 50
995.	" " " Pen, 3½ " " " . .	"	1 50
996.	Set of Bows, Nos. 993, 994, 995, in case, ...	Per set,	5 00

These Bows have a screw on a right-and-left thread, which holds the points firmly in any position. Above Bow Pencils and Bow Pens fitted with our patent screw-thread needle points.

FINE GERMAN INSTRUMENTS

Third Best Grade

Of German Silver and Steel Points.

Illustrations ⅔ size.

No. 1005. 1007. 1013. 1016. 1019. 1020. 1021.

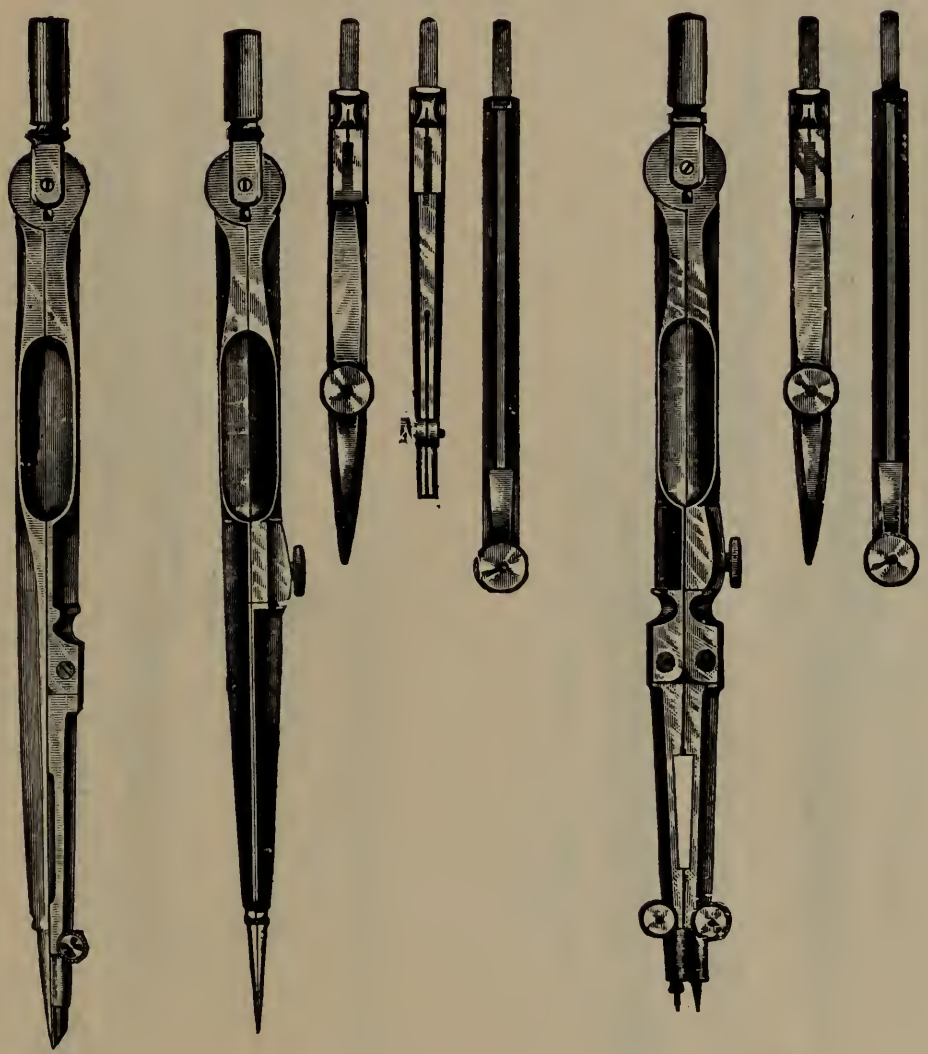
No. 1005.	Plain Dividers,	3½ in.,	. . . . .	Each,	$0 72
1007	" "	6 "	. . . . .	"	84
1007S.	" "	6 "	with straightening device,	"	1 04
1008.	" "	7 "	. . . . .	"	96
1013.	Three-legged Dividers,	5 "	. . . . .	"	3 00
1016.	Hairspring Dividers,	6 "	. . . . .	"	1 80
1016S.	" "	6 "	with straightening device,	"	2 00
1017.	" "	7 "	. . . . .	"	2 30
1019.	Compasses	4¼ in.,	with fixed needle and pencil point,	"	2 30
1020.	"	4¼ "	" " " pen point,	"	2 30
1020½	Compasses,	4¼ "	" fixed needle point, pen and pencil point, ...	"	2 65
1021.	Compasses,	4¼ in.,	with 2 steel points, pen, pencil and needle point, ...	"	3 00

FINE GERMAN INSTRUMENTS

Third Best Grade

Of German Silver and Steel Points.

Illustrations ⅔ size.



No. 1022. 1023. 1024.

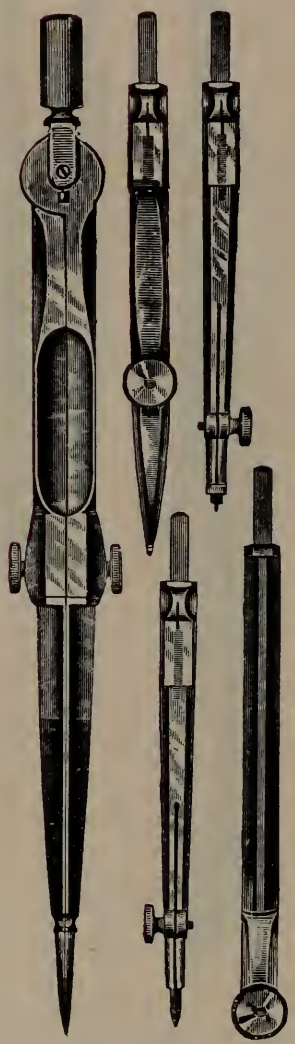
No. 1022.	Compasses, 6 in., with steel point leg and fixed pencil point,	Each,	$1 25
1023.	Compasses, 6 in., with steel point, pen, pencil point and lengthening bar,	"	2 25
1024.	Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar,	"	2 65
1024S.	Compasses, 6 in., like No. 1024, but with straightening device,	"	2 85
1025.	Compasses, 6 in., Hairspring, with fixed needle point, pen, pencil point and lengthening bar,	"	3 25
1025S.	Compasses, 6 in., like No. 1025, but with straightening device,	"	3 45

FINE GERMAN INSTRUMENTS

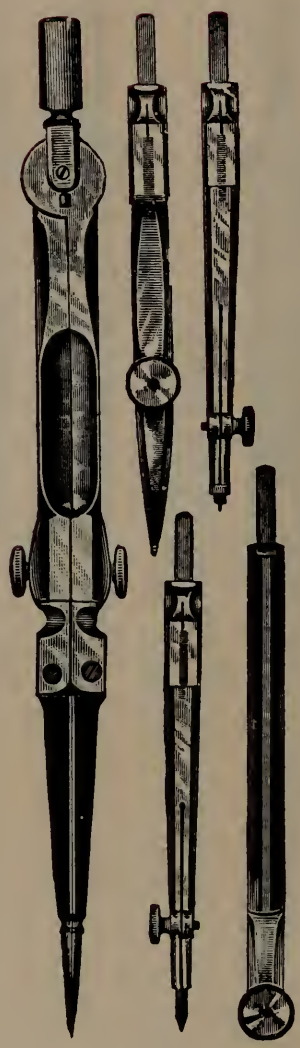
Third Best Grade

Of German Silver and Steel Points.

Illustrations ⅔ size.



No. 1026.



1027.

No. 1026. Compasses, 6 in., with 2 steel points, pen, pencil and needle point, and lengthening bar, ... Each, $3 00

1027. Compasses, 6 in., the same as No. 1026, but with joint in each leg, ... " 3 90

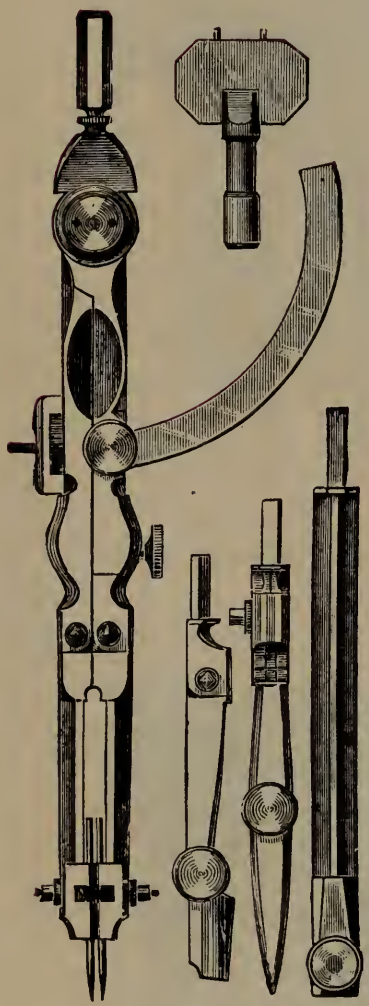
Above Compasses fitted with our patent screw-thread needle points.

FINE GERMAN INSTRUMENTS

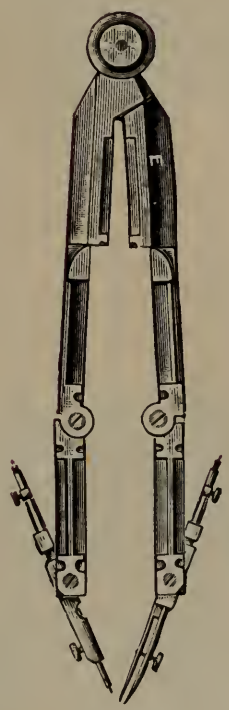
Third Best Grade

Of German Silver and Steel Points.

Illustrations $\frac{2}{3}$ size.



No. 1028.



1029.

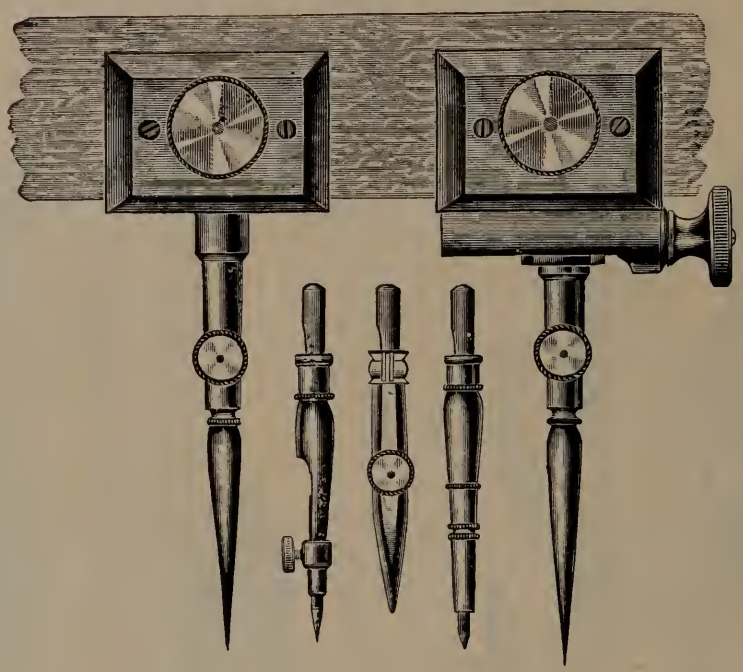
1031.

No. 1028.	Lithographic Compasses, very strong, with arc, set screw and micrometer adjustment, 8 in., with pen and pencil point, lengthening bar and wrench key, in case,	Each,	$13 80
1029.	Pocket Compasses, with folding points, pen, pencil and needle points, ...	"	5 70
1031.	Proportional Divider, $7\frac{1}{4}$ in., for lines and circles, in case, ...	"	6 90

FINE GERMAN INSTRUMENTS

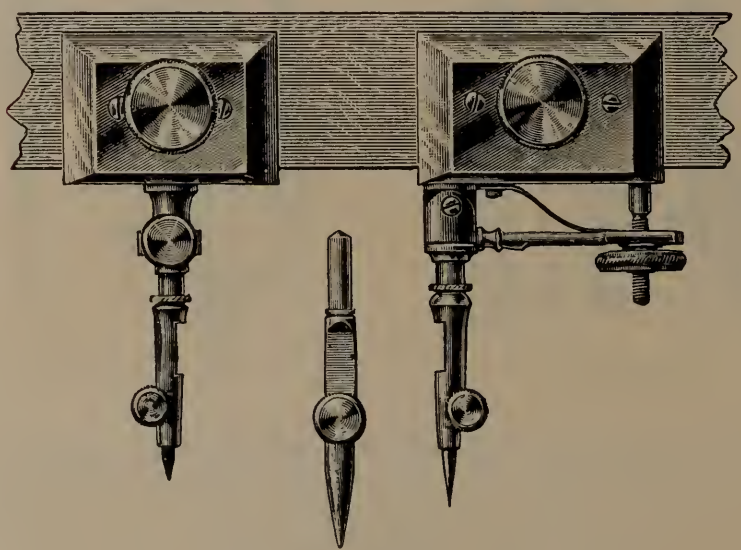
Third Best Grade

Of German Silver and Steel Points.



No. 1033.

No. 1033. Beam Compasses, to fit on any straight edge, with two steel points, pen, pencil and needle point, . . . Each, $5 75
1033C. Beam Compasses No. 1033 in morocco case, . . " 6 50



No. 1034.

No. 1034. Beam Compasses, to fit on any straight edge, with fixed needle, pen and pencil points, ... Each, 5 80
1034C. Beam Compasses No. 1034 in morocco case, . . . " 6 60

FINE GERMAN INSTRUMENTS

IN MOROCCO POCKET CASES, LINED WITH VELVET.

The Third Best Grade of Instruments.

Of German Silver and Steel Points.

For description of quality see page 55.

No. 1059.

No. 1059. Cont'g:
No. 947 Ruling Pen, 5½ in., with spring and ebony handle
1007 Plain Dividers, 6 in.
1024 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $4 60

No. 1059S. Containing same assortment as No. 1059, but Dividers and Compasses with straightening device. Per set, . 5 00

No. 1062.

No. 1062. Cont'g:
No. 947 Ruling Pen, 5½ in., with spring and ebony handle.
990 Steel Spring Bow Pen, 3½ in., metal handle.
1007 Plain Dividers, 6 in.
1024 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $6 00

No. 1062S. Containing same assortment as No. 1062, but Dividers and Compasses with straightening device. Per set, . 6 40

FINE GERMAN INSTRUMENTS
IN CASES

Third Best Grade

Of German Silver and Steel Points.

No. 1064.

No. 1064. Cont'g:
No. 947 Ruling Pen, 5½ in., with spring and ebony handle,
989 Steel Spring Bow Pencil, 3½ in., metal handle.
990 " " " Pen, 3½ " " "
1016 Hairspring Dividers, 6 in.
1024 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $8 60

No. 1064S. Containing same assortment as No. 1064, but Dividers and Compasses with straightening device. Per set, . 9 00

No. 1065. Containing same assortment as No. 1064, but in Pocket Book Case, velvet lined. Per set, ... 9 10

No. 1065S. Containing same assortment as No. 1065, but Dividers and Compasses with straightening device. Per set, . 9 50

No. 1068.

No. 1068. Cont'g:
No. 945 Ruling Pen, 4¼ in., with spring and ebony handle.
947 " " 5½ " " " " " "
988 Steel Spring Bow Dividers, 3½ in., metal handle.
989 " " " Pencil, 3½ " " "
990 " " " Pen, 3½ " " "
1016 Hairspring Dividers, 6 in.
1024 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $9 50

No. 1068S. Containing same assortment as No. 1068, but Dividers and Compasses with straightening device. Per set, . 9 90

FINE GERMAN INSTRUMENTS
IN CASES

Third Best Grade

Of German Silver and Steel Points.

No. 1070.

No. 1070. In Pocket Book case, velvet lined, cont'g:

No. 945 Ruling Pen, 4¼ in., with spring and ebony handle.
947 " " 5½ " " " " " "
988 Steel Spring Bow Dividers, 3½ in., metal handle.
989 " " " Pencil, 3½ " " "
990 " " " Pen, 3½ " " "
1016 Hairspring Dividers, 6 in.
1024 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.

Box with Leads. Per set, ... $10 00

No. 1070S. Containing same assortment as No. 1070, but Dividers and Compasses with straightening device.

Per set, ... $10 40

Any other assortments in morocco cases fitted up to order at short notice.

See Empty Morocco Cases on pages 161-162.

FINE GERMAN INSTRUMENTS IN CASES

Third Best Grade

Of German Silver and Steel Points.

No. 1082.

No. 1082. In fine polished black walnut case, with lock and tray—

Cont'g: No. 953 Ruling Pen, 4 in., with joint.

957 " " 5½ " with joint and pin.

990 Steel Spring Bow Pen, 3½ in.

1007 Plain Dividers, 6 in.

1021 Compasses, 3½ in., with 2 steel points, pen, pencil and needle point.

1026 Compasses, 6 in., with 2 steel points, pen, pencil, needle point and lengthening bar.

Box with Leads. Per set, ... $14 10

No. 1083. The same as No. 1082, but with Hairspring Dividers No. 1016, in place of Plain Dividers, and with additional Bow Dividers No. 988, and Bow Pencil No. 989.

Per set, ... $17 40

FINE GERMAN INSTRUMENTS
IN CASES

Third Best Grade

Of German Silver and Steel Points.

No. 1085.

No. 1084. In fine polished black walnut case, with lock and tray—
Cont'g: No. 953 Ruling Pen, 4 in., with joint.
957 " " 5½ " with joint and pin.
968 Railroad Pen, 5½ in.
984 Steel Spring Bow Dividers, 4 in.
985 " " " Pencil, 4 "
986 " " " Pen, 4 "
1005 Plain Dividers, 3½ in., with handle.
1007 " " 6 " " "
1016 Hairspring Dividers, 6 in.
1021 Compasses, 3½ in., with 2 steel points, pen, pencil and needle point.
1026 Compasses, 6 in., with 2 steel points, pen, pencil and needle point, and lengthening bar.
1031 Proportional Dividers, 7¼ in.
Box with Leads. Per set, ... $31 50

No. 1085. Containing the same as No. 1084, with addition of Beam Compasses No. 1033. Per set, ... $39 00

FINE GERMAN INSTRUMENTS IN CASES

Third Best Grade

Of German Silver and Steel Points.

No. 1082.

No. 1082. In fine polished black walnut case, with lock and tray—

Cont'g: No. 953 Ruling Pen, 4 in., with joint.

957 " " 5½ " with joint and pin.

990 Steel Spring Bow Pen, 3½ in.

1007 Plain Dividers, 6 in.

1021 Compasses, 3½ in., with 2 steel points, pen, pencil and needle point.

1026 Compasses, 6 in., with 2 steel points, pen, pencil, needle point and lengthening bar.

Box with Leads. Per set, ... $14 10

No. 1083. The same as No. 1082, but with Hairspring Dividers No. 1016, in place of Plain Dividers, and with additional Bow Dividers No. 988, and Bow Pencil No. 989.

Per set, ... $17 40

FINE GERMAN INSTRUMENTS
IN CASES

Third Best Grade

Of German Silver and Steel Points.

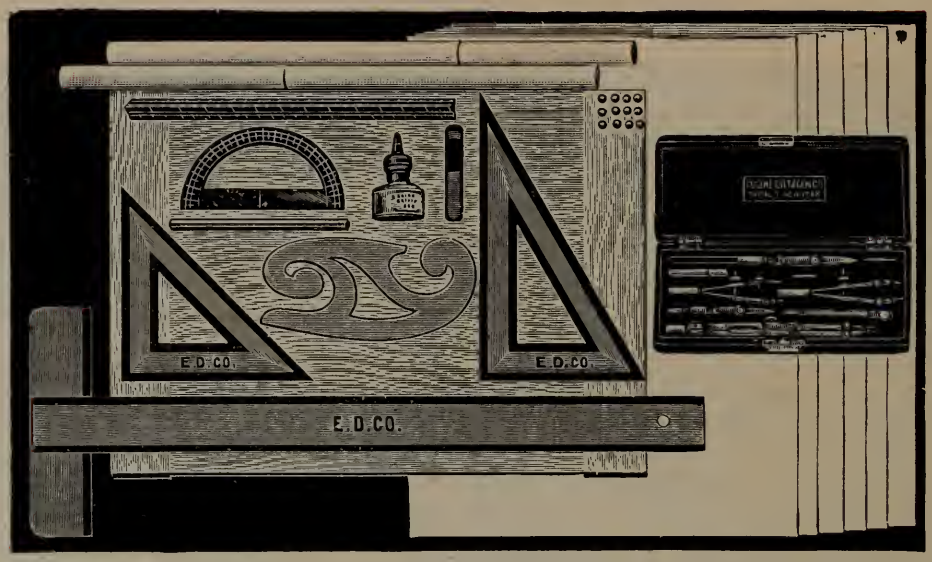
No. 1085.

No. 1084. In fine polished black walnut case, with lock and tray—
Cont'g: No. 953 Ruling Pen, 4 in., with joint.
957 " " 5½ " with joint and pin.
968 Railroad Pen, 5½ in.
984 Steel Spring Bow Dividers, 4 in.
985 " " " Pencil, 4 "
986 " " " Pen, 4 "
1005 Plain Dividers, 3½ in., with handle.
1007 " " 6 " " "
1016 Hairspring Dividers, 6 in.
1021 Compasses, 3½ in., with 2 steel points, pen, pencil and needle point.
1026 Compasses, 6 in., with 2 steel points, pen, pencil and needle point, and lengthening bar.
1031 Proportional Dividers, 7¼ in.
Box with Leads. Per set, ... $31 50

No. 1085. Containing the same as No. 1084, with addition of Beam Compasses No. 1033. Per set, ... $39 00

STUDENT'S DRAWING OUTFITS

Specially Adapted for Students of Correspondence Schools.



No. 1095.

These outfits are intended for students of Correspondence Schools teaching Mechanics and Engineering. The Instruments in Outfit No. 1095 are good and serviceable. The joint in compasses is better and will wear evener and truer than the cheap tongue-joint. All the other material is of our regular stock and not of an inferior grade.

No. 1095. Consists of following:
1 set Drawing Instruments in morocco case, containing:
No. 947 Ruling Pen, 5½ in., with spring and ebony handle.
989 Steel Spring Bow Pencil, 3½ in., metal handle.
990 " " " Pen, 3½ " " "
1024 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
2 extra Needle Points, one for Compasses and one for Bow Pencil
Box with Leads.
1 Drawing Board, 16×22 in., selected pine, good ledges.
1 T Square, 24 in., mahogany and ebony-lined blade.
1 Protractor, 6 in., German silver, engine divided (not stamped).
1 Scale, 12 in., triangular, boxwood, best quality.
1 Triangle, 30°×60°, 9 in., mahogany, ebony-lined.
1 Triangle, 45°, 7¾ in., mahogany, ebony-lined.
1 Curve, best grade, cherry, No. 16.
1 dozen Steel Tacks, steel capped, thin edges, round tops.
1 Pencil, Koh-i-noor, 4H.
1 bottle of Ink, Higgins, Waterproof Black.
1 Ink and Pencil Eraser, Faber.
2 sheets Imperial Tracing Cloth, 16×22 in.
6 sheets Whatman's Paper, Demy, 15×20 in.
Outfit, complete, ... Each, $12 00

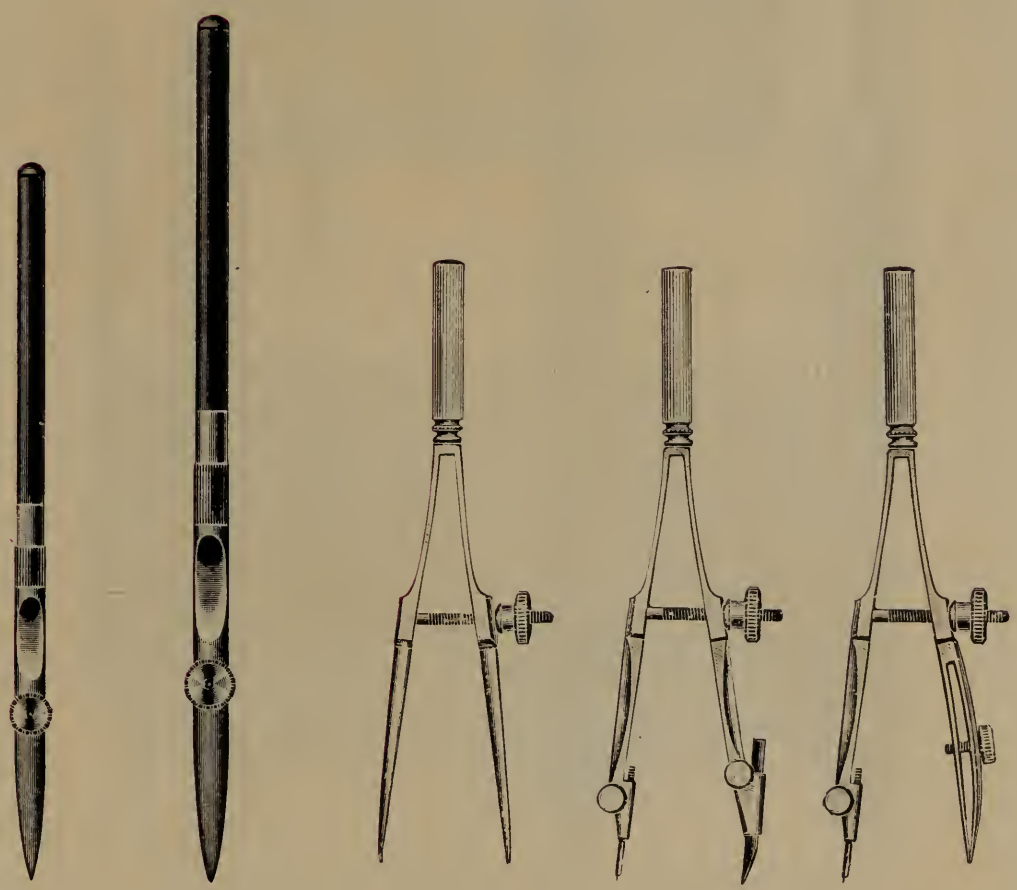
No. 1096. Same Outfit as No. 1095, but with Pivot joint Compasses No. 913 in set of Instruments in place of Compasses No. 1024,
Each, ... 13 75

UNIVERSAL INSTRUMENTS

Of German Silver and Steel Points.

For description of quality see page 55.

Illustrations $\frac{2}{3}$ size.



No. 1108. 1110. 1112. 1113. 1114.

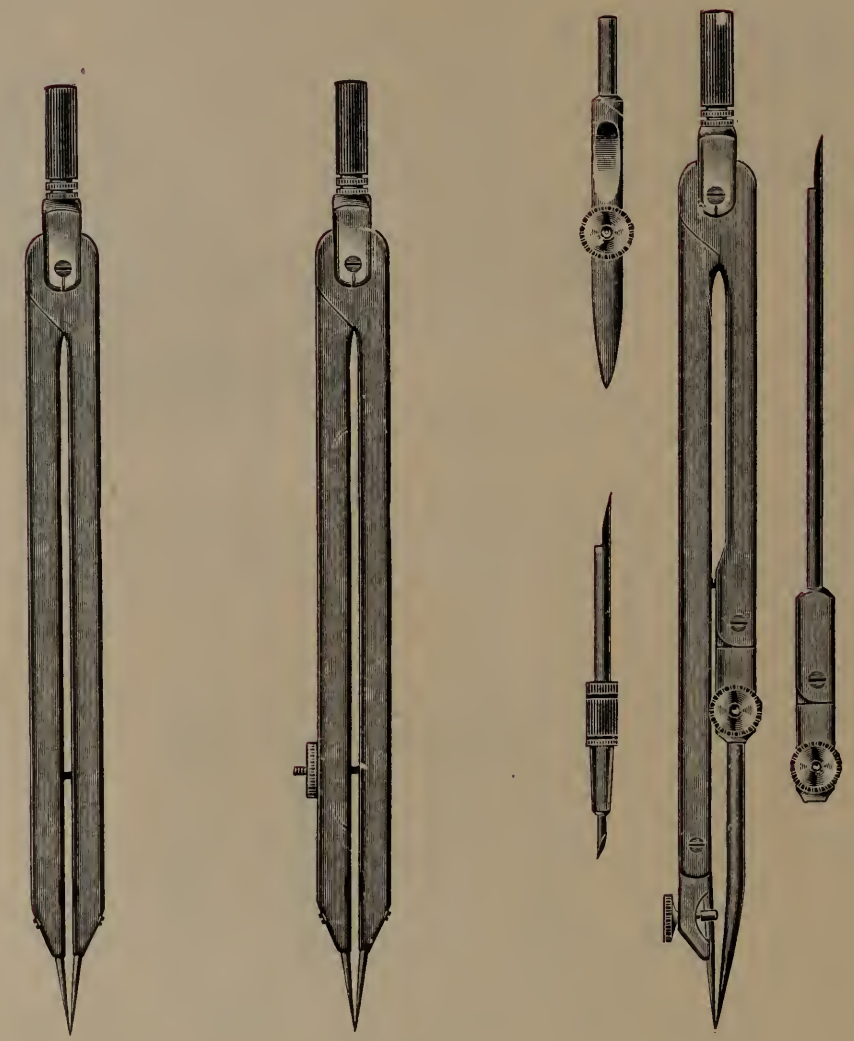
No. 1108.	Ruling Pen, 4 in., spring blade, ...	Each,	$0 50
1110.	" " $5\frac{1}{4}$ " " "	"	60
1112.	Steel Spring Bow Dividers, $3\frac{1}{2}$ in., metal handle, .	"	80
1113.	" " " Pencil, $3\frac{1}{2}$ " " " .	"	1 00
1114.	" " " Pen, $3\frac{1}{2}$ " " " .	"	1 00

These Instruments are listed in sets under Nos. 1125 to 1135.

UNIVERSAL INSTRUMENTS *Continued*

Of German Silver and Steel Points

Illustrations $\frac{2}{3}$ size.



No. 1117. 1118. 1120.

No. 1117.	Plain Dividers, 6 in., ...	Each,	$0 72
1118.	Hairspring Dividers, 6 in., ...	"	1 50
1120.	Compasses, 6 in., with fixed needle point, divider point, pen, pencil point and lengthening bar, . .	"	2 25

These Instruments are listed in sets under Nos. 1125 to 1135.

UNIVERSAL INSTRUMENTS

IN MOROCCO POCKET CASES, LINED WITH COTTON VELVET.

Of German Silver and Steel Points.

For description of quality see page 55.

No. 1125.

No. 1125. Cont'g:
No. 1110 Ruling Pen, 5¼ in., spring blade.
1120 Compasses, 6 in., with fixed needle point, divider point, pen, pencil point, and lengthening bar.
Box with 3 needle points. Lead Box and Key, Per set, $3 60

No. 1127.

No 1127. Cont'g:
No. 1110 Ruling Pen, 5¼ in., spring blade.
1114 Steel Spring Bow Pen, 3½ in., metal handle.
1120 Compasses, 6 in., with fixed needle point, divider point, pen, pencil point and lengthening bar.
Box with 3 needle points. Lead Box and Key. Per set, $4 75

No. 1128. Containing same assortment as No. 1127, but with addition of Plain Dividers No. 1117. Per set, ... 5 50

No. 1129. Cont'g:
No. 1110 Ruling Pen, 5¼ in., spring blade.
1113 Steel Spring Bow Pencil, 3½ in., metal handle.
1114 " " " Pen 3½ " " "
1117 Plain Dividers, 6 in.
1120 Compasses, 6 in., with fixed needle point, divider point, pen, pencil point and lengthening bar.
Box with 3 needle points. Lead Box and Key. Per set, 6 70

UNIVERSAL INSTRUMENTS IN CASES *Continued*

Of German Silver and Steel Points.

No. 1130.

No. 1130. Cont'g:

No. 1110 Ruling Pen, $5\frac{1}{4}$ in., spring blade.
1112 Steel Spring Bow Dividers, $3\frac{1}{2}$ in., metal handle.
1113 " " " Pencil, $3\frac{1}{2}$ " " "
1114 " " " Pen, $3\frac{1}{2}$ " " "
1117 Plain Dividers, 6 in.
1120 Compasses, 6 in., with fixed needle point, divider point, pen, pencil point and lengthening bar.
Box with 3 needle points. Lead Box and Key. Per set, $7 25

No. 1131. Containing same assortment as No. 1130, but in Pocket Book Case, ... " 7 60

No. 1134.

No. 1134. Cont'g:

No. 1108 Ruling Pen, 4 in., spring blade.
1110 " " $5\frac{1}{4}$ " " "
1112 Steel Spring Bow Dividers, $3\frac{1}{2}$ in., metal handle.
1113 " " " Pencil, $3\frac{1}{2}$ " " "
1114 " " " Pen, $3\frac{1}{2}$ " " "
1118 Hairspring Dividers, 6 in.
1120 Compasses, 6 in., with fixed needle point, divider point, pen, pencil point and lengthening bar.
Box with 3 needle points. Lead Box and Key. Per set, $8 40

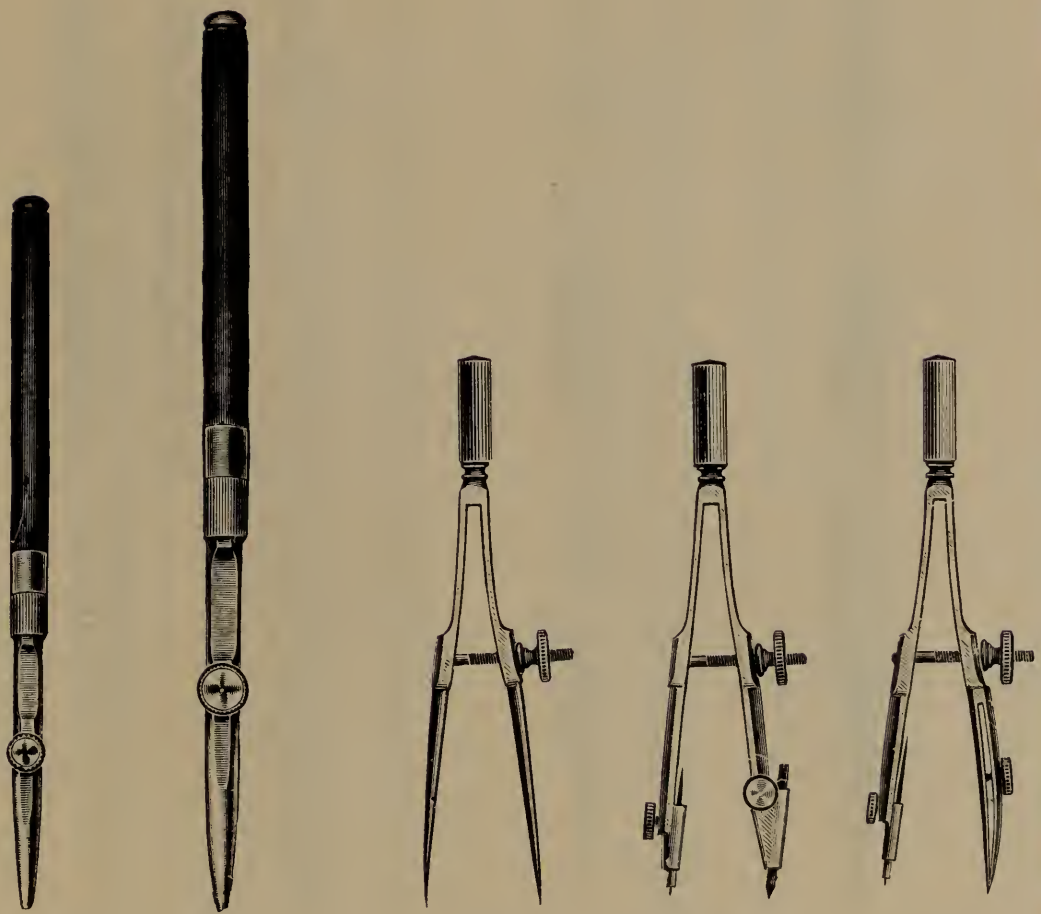
No. 1135. Containing same assortment as No. 1134, but in Pocket Book Case. Per set, ... 8 80

RELIANCE INSTRUMENTS

Of German Silver and Steel Points.

For description of quality see page 55.

Illustrations ⅔ size.



No. 1140. 1142. 1144. 1145. 1146.

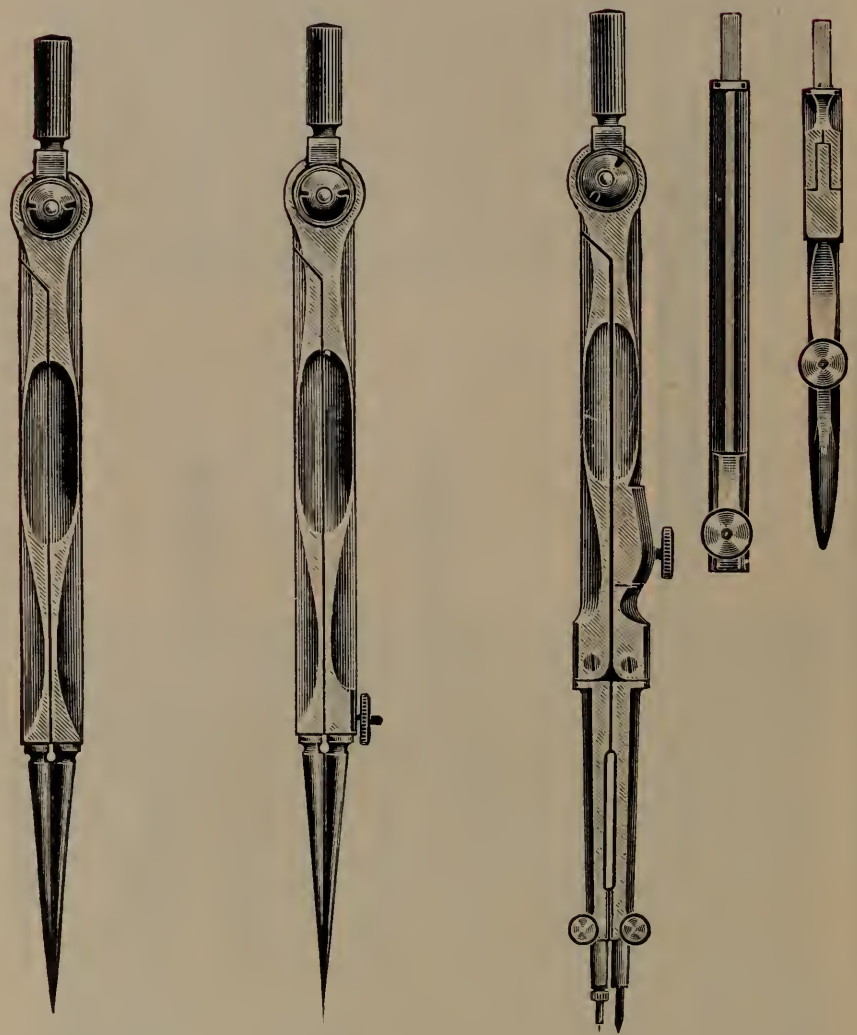
No. 1140.	Ruling Pen, 4 in., spring blade, ...	Each,	$0 44
1141.	" " 5 " " "	"	52
1142.	" " 5½ " " "	"	55
1144.	Steel Spring Bow Dividers, 3¼ in., metal handle, .	"	80
1145.	" " " Pencil, 3¼ " " " . .	"	1 00
1146.	" " " Pen, 3¼ " " " . .	"	1 00

These Instruments are listed in sets under Nos. 1159 to 1189P.

RELIANCE INSTRUMENTS *Continued*

Of German Silver and Steel Points.

Illustrations $\frac{2}{3}$ size.



No. 1148. 1149. 1150.

No. 1148.	Plain Dividers, 6 in., ...	Each,	$0 60
1149.	Hairspring Dividers, 6 in., ...	"	1 35
1150.	Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, ...	"	1 90

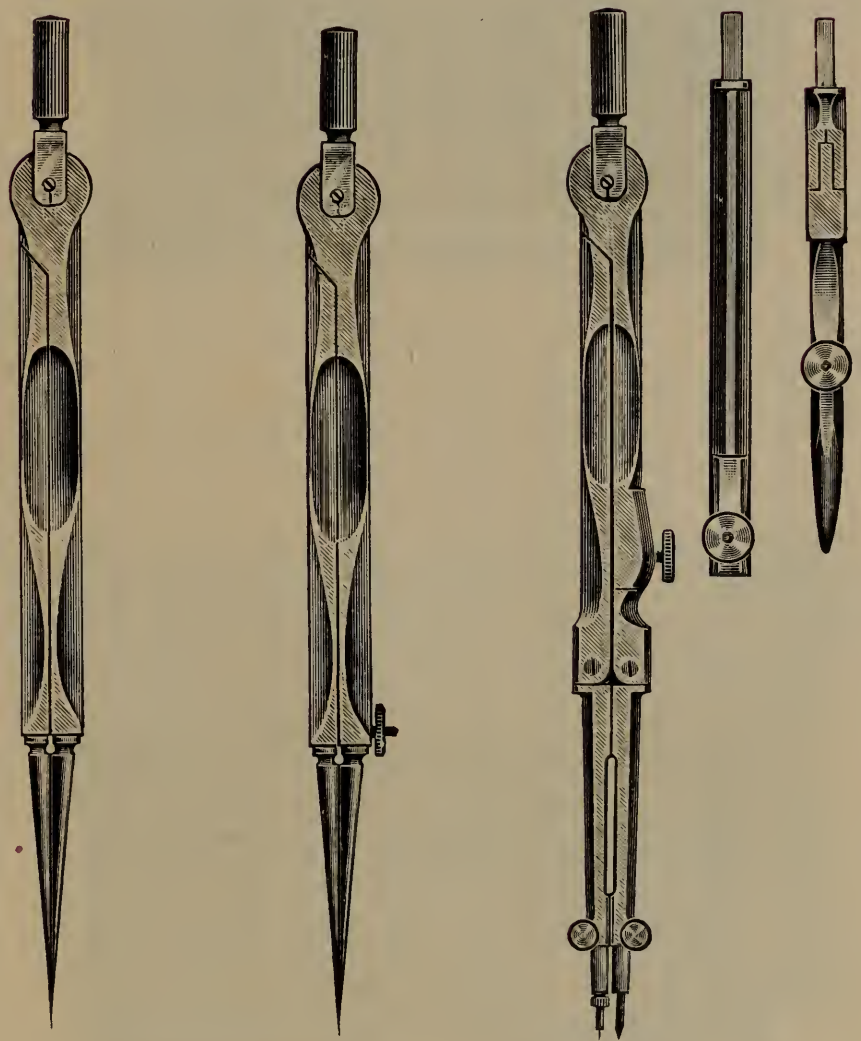
Above Compasses fitted with our patent screw-thread needle point.

These Instruments are listed in sets under Nos. 1159 to 1169P.

RELIANCE INSTRUMENTS *Continued*

Of German Silver and Steel Points.

Illustrations $\frac{2}{3}$ size.



No. 1154. 1155. 1156.

No. 1154.	Plain Dividers, 6 in., ...	Each,	$0 60
1155.	Hairspring Dividers, 6 in., ...	"	1 35
1156.	Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar, ...	"	1 90

Above Compasses fitted with our patent screw-thread needle point.

These Instruments are listed in sets under Nos. 1179 to 1189P.

RELIANCE INSTRUMENTS

IN MOROCCO POCKET CASES, LINED WITH COTTON VELVET.

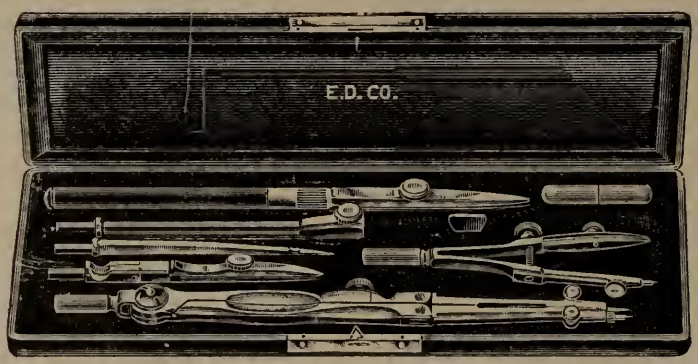
Of German Silver and Steel Points.

For description of quality see page 55.

No. 1159.

No. 1159. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1150 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Extra steel divider point.
Box with Leads.
Per set, ... $3 00

No. 1160. Containing same assortment as No. 1159, but with addition of Plain Dividers, No. 1148, and without divider point,
Per set, ... 3 60



1162.

No. 1162. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1146 Steel Spring Bow Pen, 3¼ in , metal handle.
1150 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Extra steel divider point.
Box with Leads.
Per set, ... $4 00

RELIANCE INSTRUMENTS IN CASES *Continued*

Of German Silver and Steel Points.

No. 1163.

No. 1163. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1146 Steel Spring Bow Pen, 3¼ in., metal handle.
1148 Plain Dividers, 6 in.
1150 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads.
Per set, ... $4 75

No. 1164.

No. 1164. Cont'g:
No. 1142 Ruling Pen. 5½ in., spring blade.
1145 Steel Spring Bow Pencil, 3¼ in., metal handle.
1146 " " " Pen, 3¼ " " "
1148 Plain Dividers, 6 in.
1150 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads.
Per set, ... $5 90

No. 1164P. Containing same assortment as No. 1164, but in Pocket Book case. Per set, ... 6 25

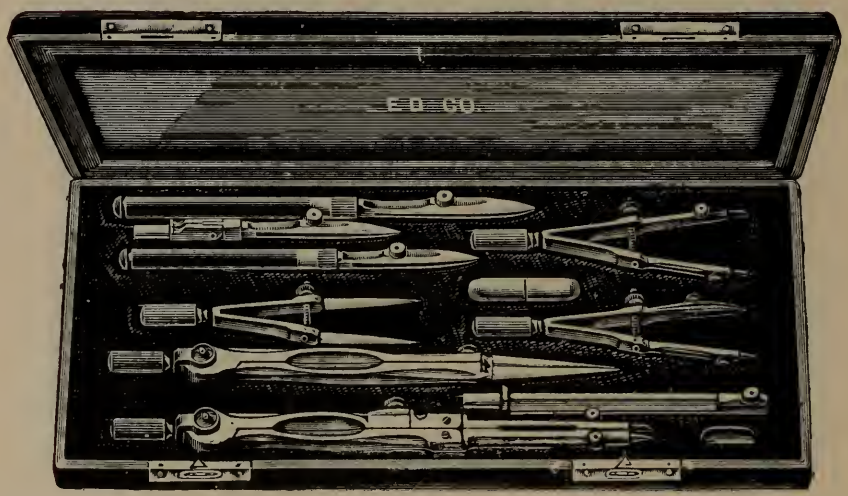
RELIANCE INSTRUMENTS IN CASES *Continued*

Of German Silver and Steel Points.

No. 1168.

No. 1168. Cont'g:
No. 1142 Ruling Pen, $5\frac{1}{2}$ in., spring blade.
1144 Steel Spring Bow Dividers, $3\frac{1}{4}$ in., metal handle.
1145 " " " Pencil, $3\frac{1}{4}$ " " "
1146 " " " Pen, $3\frac{1}{4}$ " " "
1148 Plain Dividers, 6 in.
1150 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $6 50

No. 1168P. Containing same assortment as No. 1168, but in Pocket Book case. Per set, ... 6 90



No. 1169.

No. 1169. Cont'g:
No. 1140 Ruling Pen, 4 in., spring blade.
1142 " " $5\frac{1}{2}$ " " "
1144 Steel Spring Bow Dividers, $3\frac{1}{4}$ in., metal handle.
1145 " " " Pencil, $3\frac{1}{4}$ " " "
1146 " " " Pen, $3\frac{1}{4}$ " " "
1149 Hairspring Dividers, 6 in.
1150 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $7 50

No. 1169P. Containing same assortment as No. 1169, but in Pocket Book case. Per set, ... 7 90

RELIANCE INSTRUMENTS IN CASES *Continued*

Of German Silver and Steel Points.

No. 1179.

No. 1179. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1156 Compasses, 6 in., with fixed needle point, pen pencil point and lengthening bar.
Extra steel divider point.
Box with Leads.

Per set, ... $3 00

No. 1180. Containing same assortment as No. 1179 but with addition of Plain Dividers, No. 1154, and without divider point.

Per set, ... 3 60

No. 1182.

No. 1182. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1146 Steel Spring Bow Pen, 3¼ in., metal handle.
1156 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Extra steel divider point.
Box with Leads.

Per set, ... $4 00

RELIANCE INSTRUMENTS IN CASES *Continued*

Of German Silver and Steel Points.

No. 1183.

No. 1183. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1146 Steel Spring Bow Pen, 3¼ in., metal handle.
1154 Plain Dividers, 6 in.
1156 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads.
Per set, ... $4 75

No. 1184.

No. 1184. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1145 Steel Spring Bow Pencil, 3¼ in., metal handle.
1146 " " " Pen, 3¼ " " "
1154 Plain Dividers, 6 in.
1156 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads.
Per set, ... $5 90

No. 1184P. Containing same assortment as No. 1184, but in Pocket Book case. Per set, ... 6 25

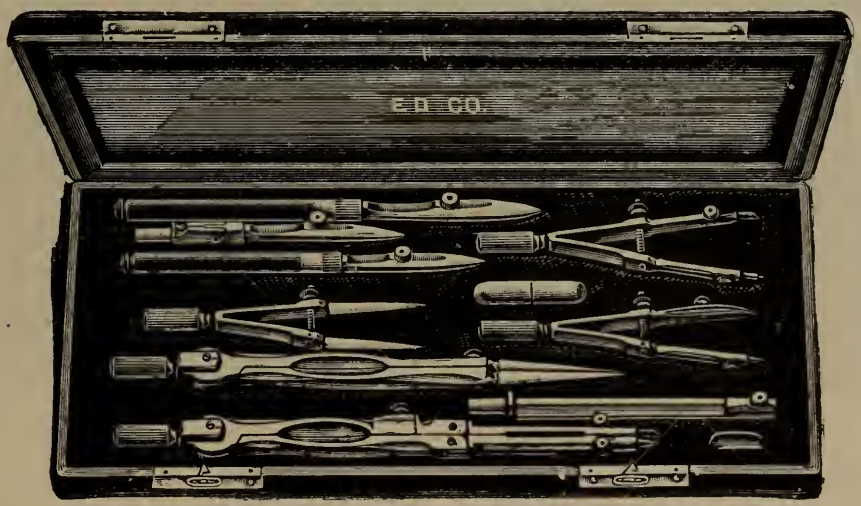
RELIANCE INSTRUMENTS IN CASES *Continued*

Of German Silver and Steel Points.

No. 1188.

No. 1188. Cont'g:
No. 1142 Ruling Pen, 5½ in., spring blade.
1144 Steel Spring Bow Dividers, 3¼ in., metal handle.
1145 " " " Pencil, 3¼ " " "
1146 " " " Pen, 3¼ " " "
1154 Plain Dividers, 6 in.
1156 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $6 50

No. 1188P. Containing same assortment as No. 1188, but in Pocket Book case. Per set, ... 6 90



No. 1189.

No. 1189. Cont'g:
No. 1140 Ruling Pen, 4 in., spring blade.
1142 " " 5½ in., " "
1144 Steel Spring Bow Dividers, 3¼ in., metal handle.
1145 " " " Pencil, 3¼ " " "
1146 " " " Pen, 3¼ " " "
1155 Hairspring Dividers, 6 in.
1156 Compasses, 6 in., with fixed needle point, pen, pencil point and lengthening bar.
Box with Leads. Per set, ... $7 50

No 1189P. Containing same assortment as No. 1189, but in Pocket Book case. Per set, ... 7 90

CARRYING CASE FOR DRAWING TOOLS

ESPECIALLY ADAPTED FOR USE OF STUDENTS

No. 1199 (but filled).

No. 1199. Carrying Case, (Empty), Hardwood polished, size, 8¼ × 13¾ × 3 in., ... Each, $3 50

These Boxes are made of quarter-sawed oak, nicely polished, with attractive handle for carrying, and are partitioned as shown in illustration. They will hold Set of Instruments, Small Triangles, Curves, Scales, Inks, Pencils, Brushes, Thumb Tacks, Erasers, etc.

Are particularly recommended to students as a safe and reliable way for carrying tools and for storing same when not in use. They are now being used at some of the leading universities, and can also be utilized to good advantage by draftsmen generally.

EMPTY POCKET BOOK STYLE CASES

Fitted for such instruments as may be selected.

These cases are covered with morocco leather and lined with either silk or cotton velvet. The Pocket Book Style Cases are superior to the old style Pocket Cases because they are stronger and more compact.

Closed.

Pocket Book Style—Open.

Size of Case.	Lined with Cotton Velvet.	Lined with Silk Velvet.
2½ × 6 inches,	Each, $1 30	Each, $1 50
3 × 7½ "	" 1 75	" 2 00
3½ × 9 "	" 2 00	" 2 50
5 × 9 "	" 2 40	" 3 00
6 × 10 "	" 3 20	" 4 00
7 × 11 "	" 3 70	" 4 50
7 × 13 "	" 4 20	" 5 00
5 × 12½ "	" 3 70	" 4 50

Polished wooden cases with lock and tray furnished to order. We recommend, however, the morocco cases, because they are more serviceable and handier.

EMPTY MOROCCO SLIDE-CATCH CASES

Fitted for Such Instruments as May Be Selected.

These cases are covered with morocco leather and lined with either silk or cotton velvet. The sets of Instruments listed in the preceding pages in Pocket Book Style Cases, we can also furnish in this style case, made to order, at same prices.

Morocco Slide-Catch Case—Closed

Morocco Slide-Catch Case—Open

Size of Case	Lined with Cotton Velvet	Lined with Silk Velvet
2½ × 6 inches,	Each, $1 30	$1 50
3 × 7½ "	" 1 70	2 00
3½ × 9 "	" 2 00	2 50
5 × 9½ "	" 2 25	2 75
6 × 10 "	" 3 00	3 75
7 × 11 "	" 3 50	4 25
7 × 13 "	" 4 00	4 75
5 × 12½ "	" 3 50	4 25

SEPARATE PARTS FOR INSTRUMENTS.

Since all parts must be fitted to the instruments, it is necessary to send us the instruments for such fitting.

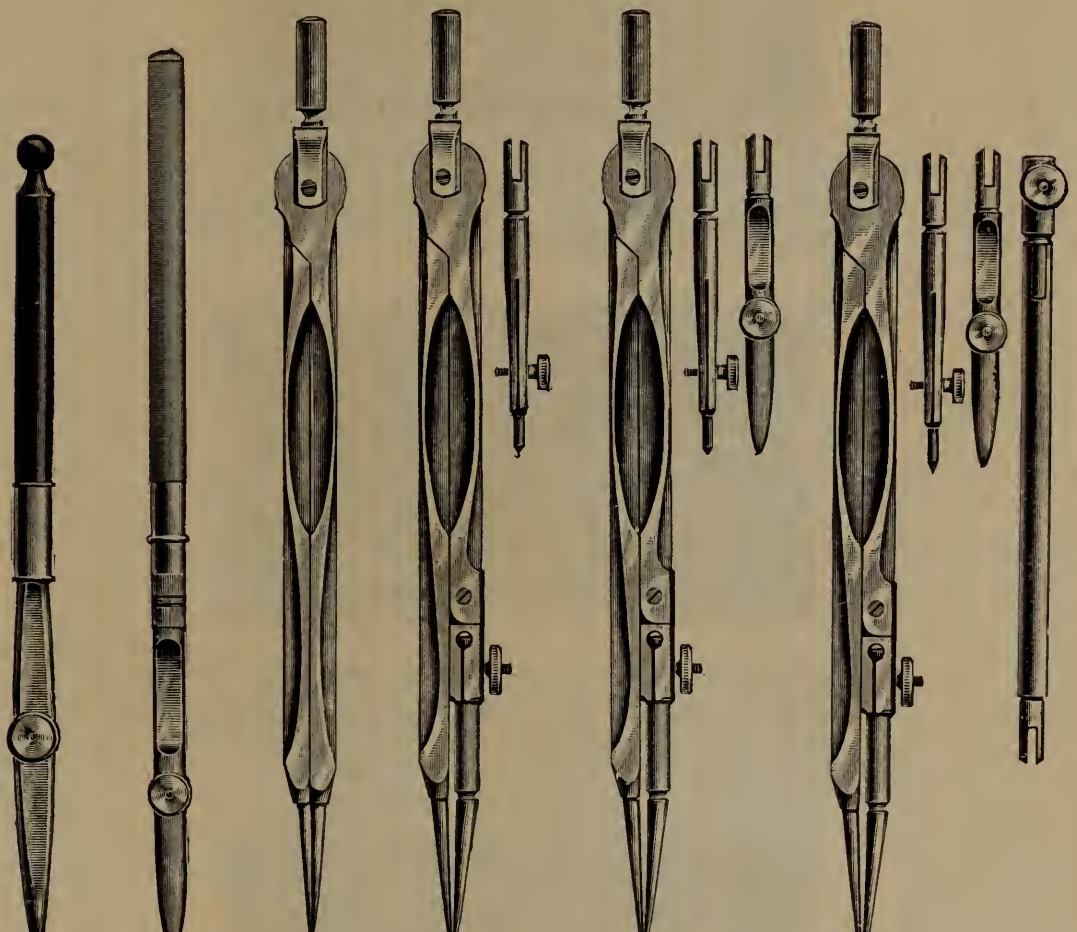
	Parts for Gem Union	Parts for German Inst.
Screws and Nuts,	Each, $0 25	$0 20
Shouldered Needles,	" 15	10
Screw-thread Needle Points,	" 20	15
Ebony and Ivory Handles for Ruling Pens,	" 25	20
Aluminum Handles for Ruling Pens,	" 30	20

NICKEL PLATED INSTRUMENTS

For Elementary School Grades.

This line of low-priced instruments is a great improvement over the French brass instruments, and, being nickel plated, they will not rust or tarnish.

For description of quality see page 55.



No. 1200. 1201. 1205. 1208. 1210. 1211.

No. 1200.	Ruling Pen,	5	in., ebony handle, . . .	Each, $0	15
1201.	" "	5½	" white bone handle and pin, .	"	33
1205.	Dividers,	5¼	" nickel-plated,	"	42
1208.	Compasses,	5¼	" with pencil point, nickel-plated,	"	65
1210.	"	5¼	" with pen and pencil point, nickel-plated, ...	"	85
1211.	"	5¼	" with pen, pencil point and lengthening bar, nickel-plated, .	"	98

NICKEL PLATED INSTRUMENTS IN CASES

For Elementary School Grades.

No. 1215.

No 1215. Pocket Case, containing Compasses, 5¼ in., with pen and pencil points, nickel-plated; Key and Lead box.
Per set, ... $0 96

No. 1217.

No. 1217. Pocket Case, containing Compasses, 5¼ in., with pen and pencil points, nickel-plated; Ruling Pen, 5 in., ebony handle; Key and Lead Box.
Per set, ... $1 15

No. 1219.

No. 1219. Pocket Case, containing Compasses, 5¼ in., with pen, pencil point and lengthening bar, nickel-plated; Ruling Pen, 5 in., ebony handle; Key and Lead Box.
Per set, ... $1 38

NICKEL PLATED INSTRUMENTS IN CASES *Continued*

For Elementary School Grades.

No. 1221.

No. 1221. Pocket Case, containing Compasses, 5¼ in., with pen, pencil point and lengthening bar, nickel-plated; Dividers, 5¼ in., nickel-plated; Ruling Pen, 5 in., ebony handle; Key and Lead Box,

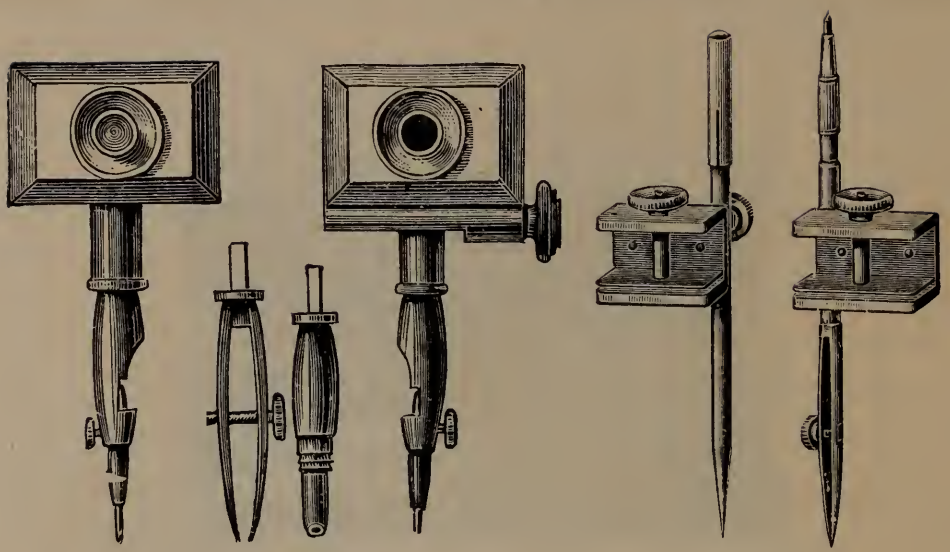
Per set, ... $1 65

No. 1223.

No. 1223. Pocket Case, containing Compasses, 5¼ in., with pen, pencil point and lengthening bar, nickel-plated; Dividers 5¼ in., nickel-plated; Spring Bow Pen, 3½ in.; Ruling Pen, 5 in. ebony handle; Key and Lead Box,

Per set, ... $2 50

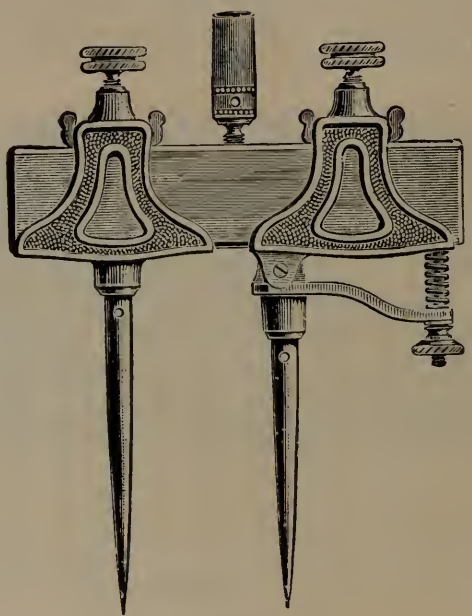
BEAM COMPASSES



Nos. 1284-1285. 1285B.

No. 1284.	Brass Beam Compasses, with pen, pencil and needle points, in case,	Each,	$5 40
1285.	German Silver Beam Compasses, with pen, pencil and needle points, in case,	"	5 70
1285B.	German Silver Beam Compasses, with steel point, pen and pencil point,	"	4 00
1285C.	Beam Compasses No. 1285B in morocco case,	"	4 75

TRAMMEL POINTS



No. 1285H.

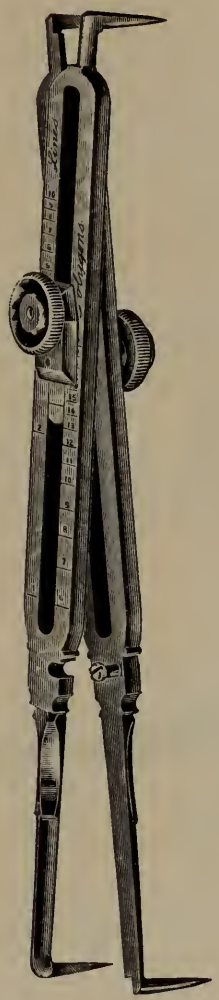
Made of Bronze metal, with forged steel points hardened. Either point can be removed, and the pencil socket accompanying each pair put in its place.

No. 1285G.	Trammel Points, with 3 in. points, not adjustable,	Each,	$1 50
1285H.	" " " 3 " " adjustable,	"	2 50

PROPORTIONAL DIVIDERS

No. 1286.

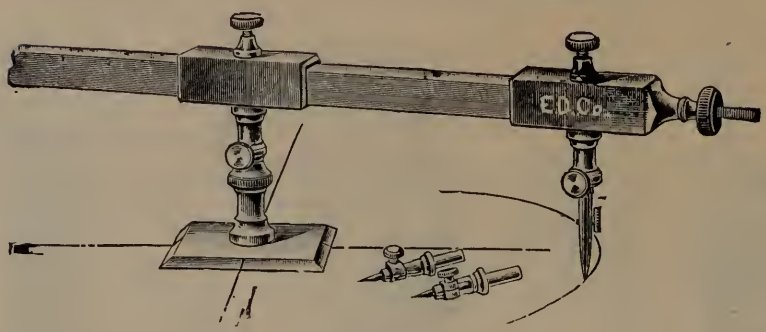
1290.



1292.

No. 1286.	Brass Proportional Dividers, 6¼ in., in case, . . .	Each,	$1 92
1288.	German Silver Proportional Dividers, 6¼ in., in case,	"	2 40
1290.	German Silver Proportional Dividers, 7 in., with Rack-Movement, graduated for lines and circles, in case,	"	6 00
1292.	German Silver Proportional Dividers, 7 in., with rectangular bent points, for lines and circles, in case,	"	7 20

IMPROVED BEAM COMPASSES

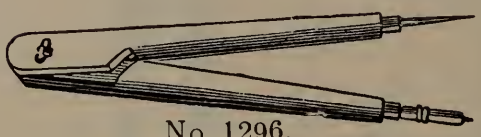


No. 1294.

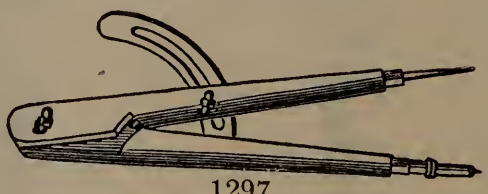
No. 1294. Beam Compasses, German Silver, with pen, pencil and needle point and wooden bar 36 in. long, ... Each, $7 50

This instrument is an improvement over other forms as it entirely does away with the common needle point and its accompanying disfigurement of the drawing, and substitutes a pillar which is easily located over the exact center by means of two cross lines on base-plate. Pivoted to the top of this pillar is a bearing, through which the square bar of hardwood slides for rough adjustment and is held by a set screw. The fine adjustment is obtained by the milled-head screw at end of bar, and has a range of about ½ inch. The instrument can also be used like the ordinary beam compasses if desired.

WOODEN BLACKBOARD DIVIDERS



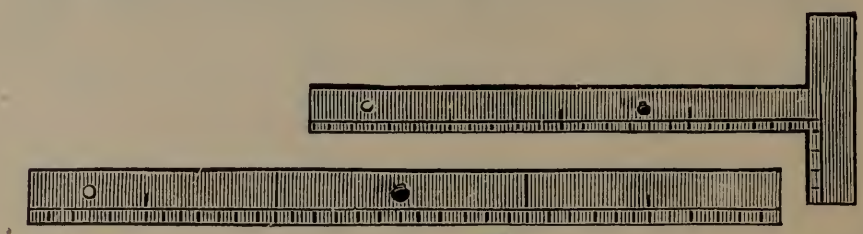
No. 1296.



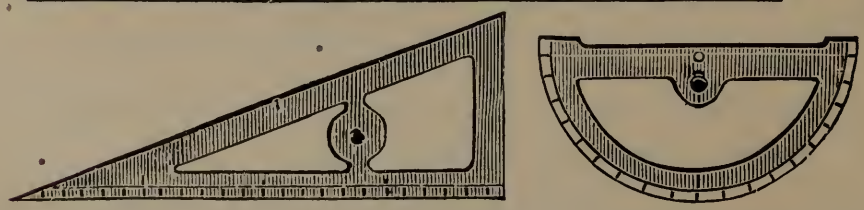
1297.

No. 1296. Wooden Blackboard Dividers, 15 in., ... Each, $1 25
1297. " " " 18 " with arc, . . " 2 00

WOODEN BLACKBOARD DRAWING SET



No. 1298.



No. 1298. Wooden Blackboard Drawing Set, consisting of 24 in. T Square, 36 in. Straight Edge, 24 in. Triangle, all divided to inches, and 15½ in. Protractor, ... Per set, $5 00

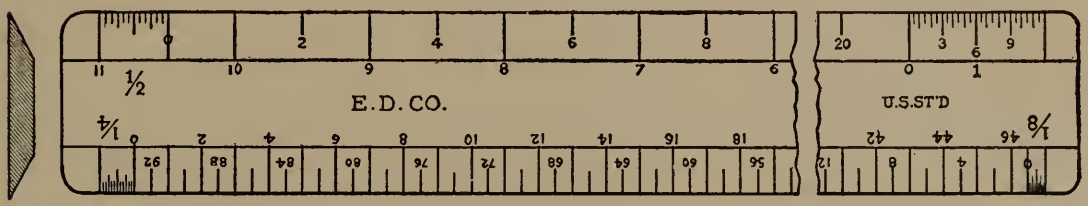
FLAT BOXWOOD SCALES

U. S. Standard. Machine Divided.

Our Scales are made of the best seasoned boxwood. The graduations are sharp and distinct, machine divided to accurate U. S. standard measurements.

The regular shape flat scale has two bevels for graduations and has some advantages over the triangular shape. The graduations can be read more conveniently than on the triangular scale, which latter, owing to its numerous divisions, is more apt to confuse and liable to error, caused by employing the wrong scale.

Flat Scales last longer, because the divided surface does not come in contact with the drawing.

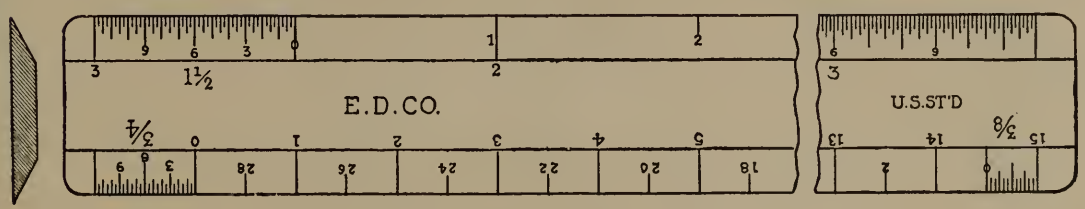


No. 1356.

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 inch to the foot.

No. 1351.	Flat Boxwood Scale,	6	in.,	Each,	$0 45
1356.	" " "	12	"	"	70
1357.	" " "	12½	"	"	80
1363.	" " "	18	"	"	1 35
1366.	" " "	24	"	"	1 75

No. 1357 covers 100 feet on $\frac{1}{8}$ in., 50 feet on $\frac{1}{4}$ in., and 25 feet on $\frac{1}{2}$ in. scale.



No. 1376.

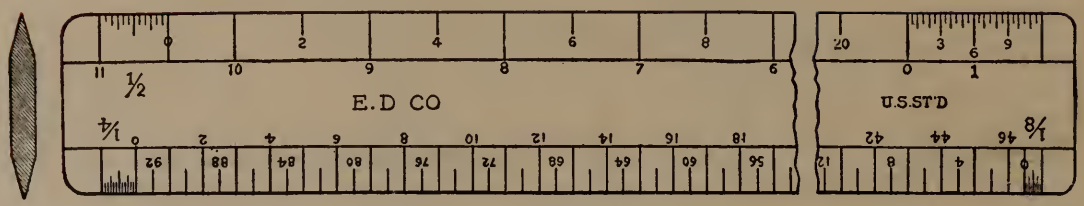
Divided: $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 inches to the foot.

No. 1371.	Flat Boxwood Scale,	6	in.,	Each,	$0 45
1376.	" " "	12	"	"	70
1381.	" " "	18	"	"	1 35
1386.	" " "	24	"	"	1 75

If Special Scales are ordered, a sketch showing divisions and numbering is required, and a remittance covering entire cost, figured at double list price of regular scales of the same kind.

FLAT BOXWOOD SCALES *Continued*

U. S. Standard. Machine Divided.

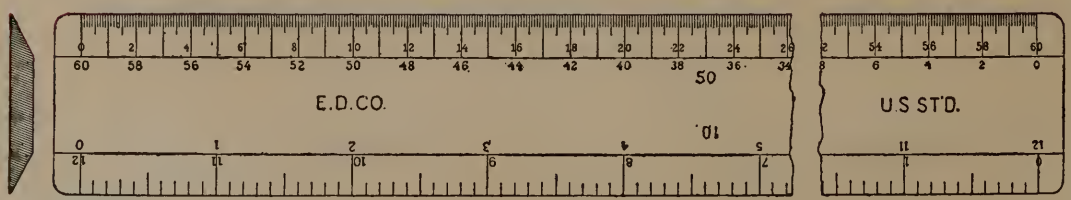


No. 1396.

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $1\times\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 inches to the foot.

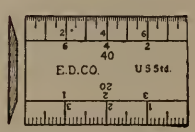
		Each.
No. 1394.	Flat Boxwood Scale, 6 in., both sides beveled and divided, .	$0 80
1396.	" " " 12 " " " " " "	1 10
1398.	" " " 18 " " " " " "	2 15
1400.	" " " 24 " " " " " "	2 90

CHAIN SCALES



No. 1426.

		Each.
No. 1420.	Flat Boxwood Chain Scale, 6 in., div. 10×50 parts to the inch,	$0 45
1421.	" " " " 6 " " 20×40 " "	45
1422.	" " " " 6 " " 30×60 " "	45
1423.	" " " " 6 " " 80×100 " "	70
1426.	" " " " 12 " " 10×50 " "	70
1427.	" " " " 12 " " 20×40 " "	70
1428.	" " " " 12 " " 30×60 " "	70
1429.	" " " " 12 " " 80×100 " "	1 10



No. 1431.

		Each.
No. 1430.	Flat Boxwood Offset Scale, 2 in., div. 10×50 parts to the inch,	$0 40
1431.	" " " " 2 " " 20×40 " "	40
1432.	" " " " 2 " " 30×60 " "	40
1433.	" " " " 2 " " 80×100 " "	65

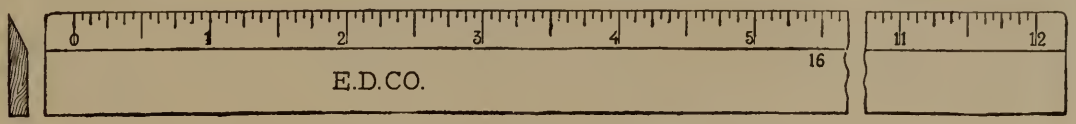
FLAT BOXWOOD SCALES *Continued*

ONE EDGE BEVELED, WITH BUT ONE DIVISION ON EACH SCALE.

U. S. Standard. Machine Divided.

These Scales were designed to overcome the objectionable features of scales with various divisions, which have the tendency to present the wrong scale, necessitating a loss of time in finding the required division.

They are made of the best seasoned boxwood, with the same care as the more expensive scales, and are somewhat narrower than the regular flat scales.



No. 1439.—12 in. long, divided to $\frac{1}{16}$ in.

Architects' Scales, div., either $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1$\frac{1}{2}$, 2, 3, 4, 6 in. to the foot.
Engineers' " " " 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch.

No. 1439.	Single Scale, 12 in., divided to $\frac{1}{16}$ in., ...	Each,	$0 20
1440.	" " 12 " division as selected (excepting 80 or 100 parts to the inch), ...	"	20
1442.	Single Scale, 12 in., divided either 80 or 100 parts to the inch, ...	"	30
1444.	Per set of 4 Scales, in case, divisions as selected, .	"	1 70
1445.	" 8 " " " " . .	"	2 75
1446.	" 12 " in polished wooden box, lined with felt and stamped with divisions, as selected, . .	"	4 00

In ordering above, please state divisions wanted.

SECOND QUALITY FLAT BOXWOOD SCALES

For School Use, Etc.

No. 1448.	Flat Boxwood Scale, 6 in., div. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 in. to the foot,	Each,	$0 30
1449.	" " " 12 " " $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 " " " "		50

MISCELLANEOUS GRADUATIONS

No. 1450.	Flat Boxwood Scale, 12 in., div. $\frac{1}{2}\times 1$ in. to the foot,	Each,	$0 70
1451.	" " " 12 " " $\frac{1}{4}\times\frac{1}{8}$ " " " "	"	70
1452.	" " " 12 " " $\frac{1}{16}$ in. $\times\frac{1}{4}$, $\frac{1}{8}$ in. to the foot,	"	70
1453.	" " " 12 " " 10×16 parts to the inch,	"	70
1454.	" " " 12 " " $\frac{1}{8}$, $\frac{1}{4}\times\frac{3}{8}$, $\frac{3}{4}$ in. to the foot,	"	70
1455.	" " " 12 " " $\frac{1}{8}$, $\frac{1}{4}\times\frac{3}{4}$, 1$\frac{1}{2}$ " " " "	"	70
1456.	" " " 12 " " 16×32 parts to the inch,	"	70
1457.	" " " 12 " " 16th in. $\times$ m m., . .	"	70

If special Scales are ordered, a sketch showing divisions and numbering is required, and a remittance covering entire cost, figured at double list price of regular Scales of the same kind.

FLAT BOXWOOD SCALES *Continued*

METRIC SCALES

U. S. Standard. Machine Divided.

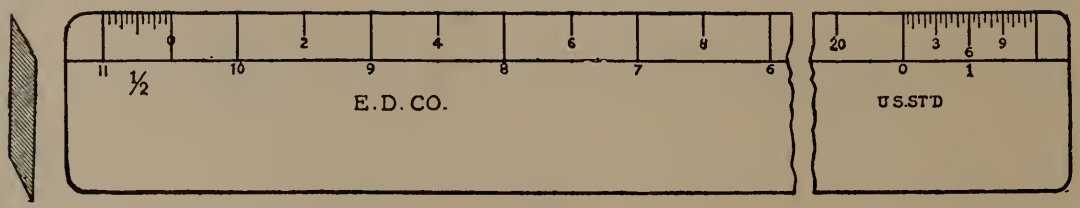
		Each.
No. 1460.	Flat Boxwood Metric Scale, 10 cm., div. mm. × half mm.,	$0 50
1462.	" " " " 20 " " " " " "	60
1464.	" " " " 30 " " " " " "	75
1466.	" " " " 50 " " " " " "	1 40

INCH AND METRIC COMPARING SCALES

No. 1468.	Flat Boxwood Inch and Metric Comparing Scale (not beveled), 30 cm., divided mm. × 16th in., on median line, Each,	$0 90
1469.	Flat Boxwood Scale, like No. 1468, but 50 cm., . . "	1 80

OPPOSITE BEVEL BOXWOOD SCALES

These Scales are an improvement over the regular flat shape, as they may be picked up more readily, and present but one graduated bevel to the eye when in use.



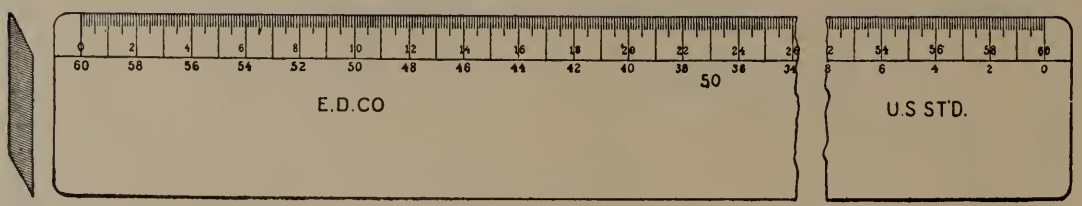
No. 1471.

Divided: $\frac{1}{8}$, $\frac{1}{4} \times \frac{1}{2}$, 1 inch to the foot.

No. 1470.	Opposite Bevel Boxwood Scale, 6 in., ... Each,	$0 45
1471.	" " " " 12 " . . . . "	70

Divided: $\frac{3}{8}$, $\frac{3}{4} \times 1\frac{1}{2}$, 3 inches to the foot.

No. 1474.	Opposite Bevel Boxwood Scale, 6 in., ... Each,	$0 45
1475.	" " " " 12 " . . . . "	70



No. 1485.

Chain Scale.—Divided: 10 × 50 parts to the inch.

No. 1480.	Opposite Bevel Boxwood Chain Scale, 6 in., . . Each,	$0 45
1485.	" " " " " 12 " . . "	70

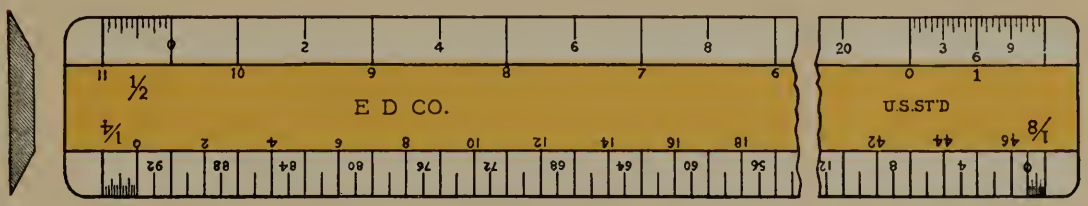
If Special Scales are ordered, a sketch showing divisions and numbering is required, and a remittance covering entire cost, figured at double list price of regular Scales of the same kind.

FLAT WHITE EDGE SCALES

U. S. Standard. Machine Divided.

All our Scales with celluloid edges are made of the best seasoned boxwood, and have inlaid divided edges on white celluloid, thus showing the black divisions in a strikingly distinct and legible way.

These Scales are more reliable and less expensive than Ivory Scales.

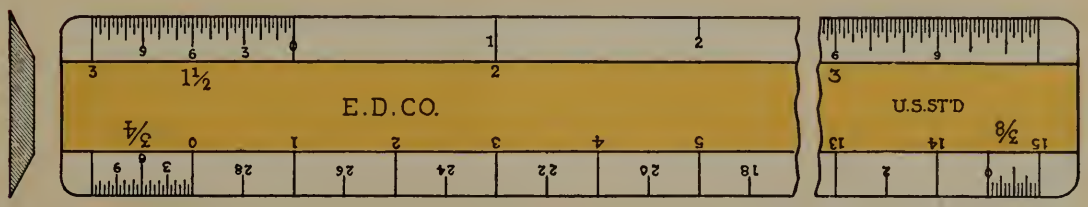


No. 1509.

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 inch to the foot.

No. 1508.	Flat White Edge Scale, 6 in., ...	Each,	$0 70
1509.	" " " " 12 "	"	1 15
1511.	" " " " 12½ "	"	1 25
1512.	" " " " 18 "	"	2 10
1513.	" " " " 24 "	"	2 75

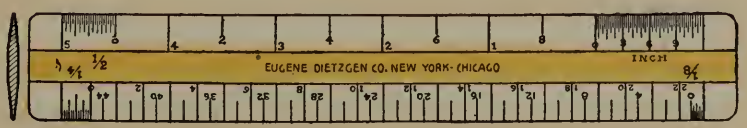
No. 1511 covers 100 ft. on $\frac{1}{8}$ in., 50 ft. on $\frac{1}{4}$ in. and 25 ft. on $\frac{1}{2}$ in. Scale.



No. 1517.

Divided: $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 inches to the foot.

No. 1516.	Flat White Edge Scale, 6 in., ...	Each,	$0 70
1517.	" " " " 12 "	"	1 15
1518.	" " " " 18 "	"	2 10
1519.	" " " " 24 "	"	2 75



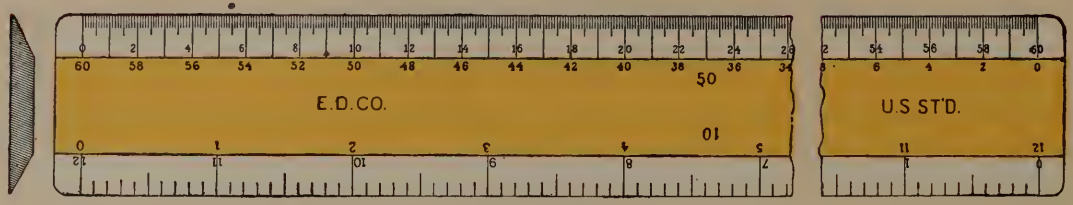
No. 1526.

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $1 \times \frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 inches to the foot.

No. 1526.	Flat White Edge Scale, 6 in., both sides beveled and divided, in leather sheath, less than one inch wide; very convenient for the pocket, ...	Each,	$1 35
1527.	Flat White Edge Scale, 12 in., both sides bev. and div.,	"	2 00
1528.	" " " " 18 " " " " "	"	3 40
1529.	" " " " 24 " " " " "	"	4 60

FLAT WHITE EDGE SCALES *Continued*

U. S. Standard. Machine Divided.



No. 1546.

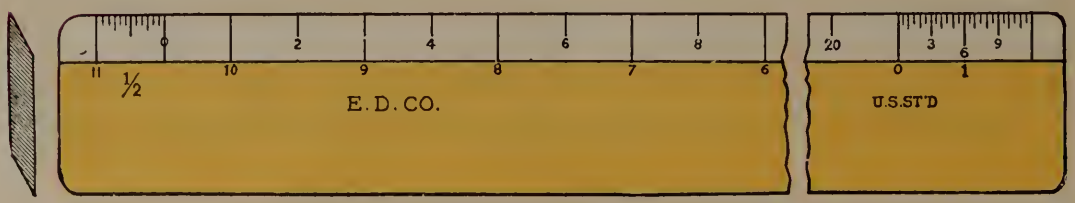
			Each.
No. 1541.	Flat White Edge Chain Scale,	6 in., div. 10×50 parts to in.	$0 70
1542.	" " " " "	6 " " 20×40 " "	70
1543.	" " " " "	6 " " 30×60 " "	70
1544.	" " " " "	6 " " 80×100 " "	90
1546.	" " " " "	12 " " 10×50 " "	1 15
1547.	" " " " "	12 " " 20×40 " "	1 15
1548.	" " " " "	12 " " 30×60 " "	1 15
1549.	" " " " "	12 " " 80×100 " "	1 50

FOOT DIVIDED DECIMALLY.

			Each.
No. 1550.	Flat White Edge Chain Scale,	12 in., div. 100×500 parts to ft.	$1 25
1551.	" " " " "	12 " " 200×400 " "	1 25
1552.	" " " " "	12 " " 300×600 " "	1 25
1553.	" " " " "	12 " " 800×1000 " "	1 75

1556. Flat White Edge Chain Scale, 6 in., both sides beveled and divided, 10 × 40 and 30 × 50 parts to the in., in leather sheath, less than one in. wide, ... Each, $1 35

OPPOSITE BEVEL WHITE EDGE SCALES



No. 1562.

Divided: $\frac{1}{8}$, $\frac{1}{4}\times\frac{1}{2}$, 1 inch to the foot.

No. 1561.	Opposite Bevel White Edge Scale,	6 in., ...	Each, $0 70
1562.	" " " " "	12 "	" 1 15

Divided: $\frac{3}{8}$, $\frac{3}{4}\times 1\frac{1}{2}$, 3 inches to the foot.

No. 1566.	Opposite Bevel White Edge Scale,	6 in., ...	Each, $0 70
1567.	" " " " "	12 "	" 1 15

No. 1572.

Chain Scale.—Divided: 10×50 parts to the inch.

No. 1571	Opposite Bevel White Edge Chain Scale,	6 in., . .	Each, $0 70
1572	" " " " "	12 " . .	" 1 15

FLAT WHITE EDGE SCALES *Continued*

U. S. Standard. Machine Divided.

MISCELLANEOUS GRADUATIONS

			Each.
No. 1573A.	Flat White Edge Scale, 12 in., div.	$\frac{1}{2} \times 1$ in. to the foot,	$1 15
1573B.	" " " " 12 " "	$\frac{1}{4} \times \frac{1}{8}$ " " " "	1 15
1573C.	" " " " 12 " "	$\frac{1}{16}$ in $\times \frac{1}{4}, \frac{1}{8}$ in. to the ft.	1 15
1573D.	Opposite Bevel W. E. " 12 " "	$\frac{1}{16}$ " $\times \frac{1}{4}, 3$ " " " "	1 15
1573E.	Flat White Edge " 12 " "	10×16 parts to the inch,	1 15
1573F.	" " " " 12 " "	$\frac{1}{8}, \frac{1}{4} \times \frac{3}{8}, \frac{3}{4}$ in. to the foot,	1 15
1573G.	" " " " 12 " "	$\frac{1}{8}, \frac{1}{4} \times \frac{3}{4}, 1\frac{1}{2}$ " " " "	1 15
1573H.	" " " " 12 " "	16×32 parts to the inch,	1 15

METRIC SCALES

No. 1574C.

			Each.
No. 1574A.	Flat White Edge Metric Scale, 10 cm., div.	mm. and half mm.	$0 75
1574B.	" " " " " 20 "	" " " " " " "	1 00
1574C.	" " " " " 30 "	" " " " " " "	1 25
1574D.	" " " " " 50 "	" " " " " " "	2 25

INCH AND METRIC SCALES

No. 1575A. Flat White Edge Scale, 30 cm. div. $\frac{1}{32}$ in. $\times$ half mm., Each, $1 50
1575B. " " " " 50 " " " " " " " " 2 40

These scales are very convenient for converting plans from one system into the other.

No. 1576A.

No. 1576A. Flat Inch and Metric Comparing Scale, white facing (not beveled), 30 cm., divided mm. $\times$ 16th. in., on median line, ... Each, $1 50
1576B. Flat Scale, like No. 1576A, but 50 cm., ... " 2 50

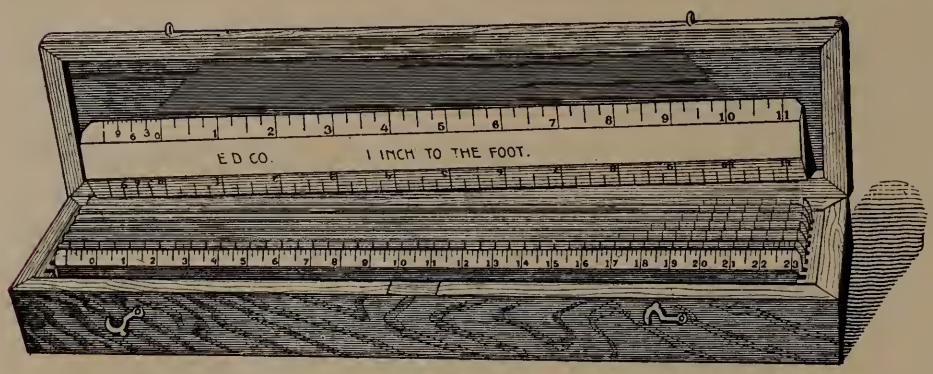
DIAMETER AND CIRCUMFERENCE SCALE

No. 1577.

No. 1577. Flat White Edge Scale, 12 in., divided for diameter and circumference, ... Each, $1 75

The divisions on this scale are in the ratio of diameter to circumference of a circle; one edge is divided in inches to 32nds., the other to spaces 3.1416 in. to 128ths.

FLAT BOXWOOD SCALES IN SETS



No. 1581.

Nos. 1580 to 1582 have the same scale on both edges; one edge is divided and figured to read from left to right, and the other from right to left.

No. 1580. Set of 4 Boxwood Scales, 12 in.
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 inch to the foot, ... Per set, $4 25

1581. Set of 8 Boxwood Scales, 12 in.
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 inches to the foot, . " 7 50

1582. Set of 12 Boxwood Scales, 12 in.
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3, 4, 6 and 12 inches to the foot, ... " 11 06

Nos. 1586 and 1587 have a different scale on each edge, each of which is figured to read both ways.

No. 1586. Set of 4 Boxwood Scales, 12 in.
Divided: 10 and 50, 20 and 40, 30 and 60, 80 and 100 parts to the inch, ... Per set, $4 70

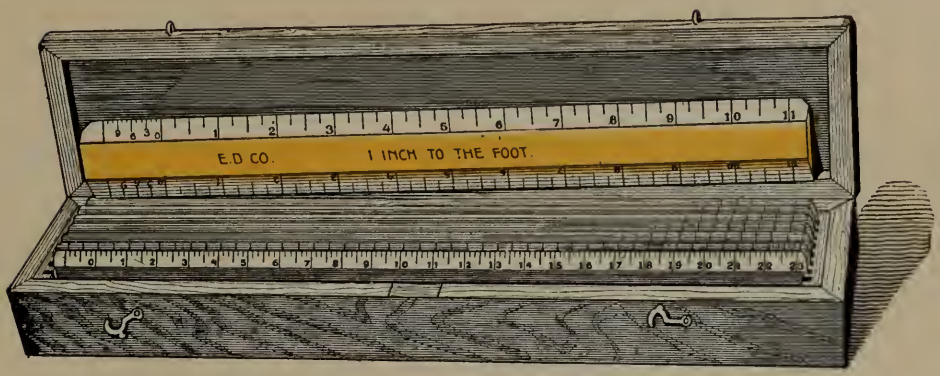
1587. Set of 8 Boxwood Scales, 4 12 in. and 4 2 in. Offset to match.
Divided: 10 and 50, 20 and 40, 30 and 60, 80 and 100 parts to the inch, ... " 7 25

Nos. 1590 and 1591 have the same scale on both edges, each edge is figured to read both ways.

No. 1590. Set of 6 Boxwood Scales, 12 in.
Divided: 10, 20, 30, 40, 50, 60 parts to the inch, . Per set, $6 00

1591. Set of 8 Boxwood Scales, 12 in.
Divided: 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch, " 9 00

FLAT WHITE EDGE SCALES IN SETS



No. 1596.

Nos. 1595 to 1597 have the same scale on both edges; one edge is divided and figured to read from left to right, and the other from right to left.

No. 1595. Set of 4 White Edge Scales, 12 in.
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 inch to the foot, ... Per set, $6 25

1596. Set of 8 White Edge Scales, 12 in.
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 inches to the foot, . " 11 50

1597. Set of 12 White Edge Scales, 12 in.
Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3, 4, 6 and 12 inches to the foot, ... " 17 00

No. 1601 has a different scale on each edge, each of which is figured to read both ways.

No. 1601. Set of 4 White Edge Scales, 12 in.
Divided: 10 and 50, 20 and 40, 30 and 60, 80 and 100 parts to the inch, ... Per set, $6 75

Nos. 1605 and 1606 have the same scale on both edges; each edge is figured to read both ways.

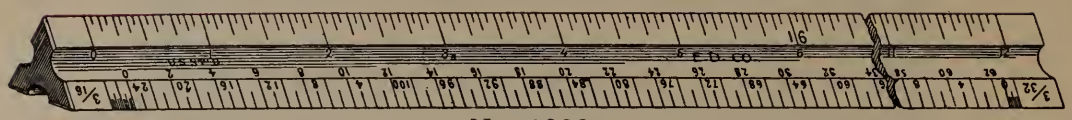
No. 1605. Set of 6 White Edge Scales, 12 in.
Divided: 10, 20, 30, 40, 50, 60 parts to the inch, . Per set, $9 00

1606. Set of 8 White Edge Scales, 12 in.
Divided: 10, 20, 30, 40, 50, 60, 80, 100 parts to the inch, " 13 00

TRIANGULAR BOXWOOD SCALES

FOR ARCHITECTS AND MECHANICAL ENGINEERS.

U. S. Standard. Machine Divided.



No. 1626.

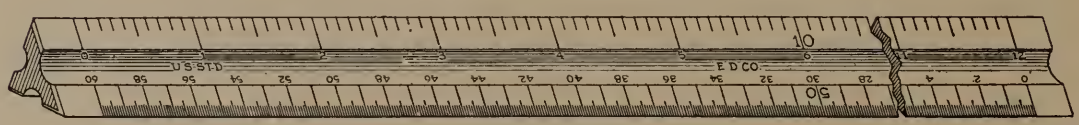
Divided: $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 in. to the foot, $\frac{1}{16}$ in.

No. 1625.	Triangular Boxwood Scale, 6 in., ... Each,	$0	50
1626.	" " " 12 " . . . . . "		75
1627.	" " " 18 " . . . . . "	2	40
1628.	" " " 24 " . . . . . "	4	20

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3, 4 in. to the foot, $\frac{1}{16}$ in.

No. 1631.	Triangular Boxwood Scale, 12 in., ... Each,	$0	75
1632.	" " " 18 " . . . . . "	2	40
1633.	" " " 24 " . . . . . "	4	20

FOR CIVIL ENGINEERS AND SURVEYORS.



No. 1636.

Divided: 10, 20, 30, 40, 50, 60 parts to the inch.

No. 1635.	Triangular Boxwood Chain Scale, 6 in., ... Each,	$0	50
1636.	" " " " 12 " . . . . "		75
1637.	" " " " 18 " . . . . "	2	40
1638.	" " " " 24 " . . . . "	4	20

Divided: 20, 30, 40, 50, 60, 80 parts to the inch.

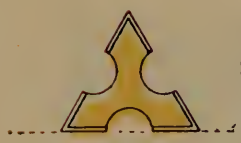
No. 1640.	Triangular Boxwood Chain Scale, 12 in., ... Each,	$0	90
1641.	" " " " 18 " . . . . "	2	40
1642.	" " " " 24 " . . . . "	4	20
1643.	" " " " 12 " divided: 100, 200, 300, 400, 500, 600 parts to the foot, ... "	1	50

TRIANGULAR BOXWOOD METRIC SCALES

		Each	
No. 1647.	Triangular Boxwood Scale, 20 cm., div. to mm. and $\frac{1}{2}$ mm.,	$1	20
1648.	" " " 30 " " " " "		1	50
1649.	" " " 50 " " " " "	2	70

TRIANGULAR WHITE EDGE SCALES

U. S. Standard. Machine Divided.

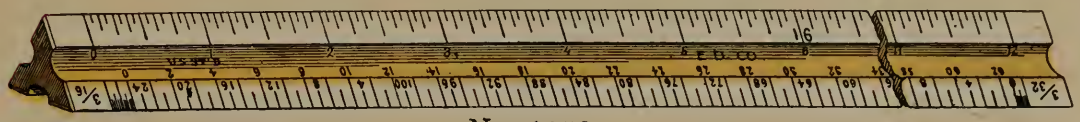


Regular Shape.

Our Triangular White Edge Scales are made in two styles—the **Regular** shape and the **Relieved Facet** shape—as shown in illustrations. On the Regular shape Scales the full surface of both facets are in contact with the drawing, affording a greater wearing surface, and will obviously not obliterate the divisions on the edges as quickly as on the Relieved Facet shape. On the latter style, however, the visual angle is such that it affords an easier reading of the scales, and as each style, therefore, has its advantages, we leave the selection to the taste of the purchaser.

Relieved Facet Shape

FOR ARCHITECTS AND MECHANICAL ENGINEERS.



No. 1656.

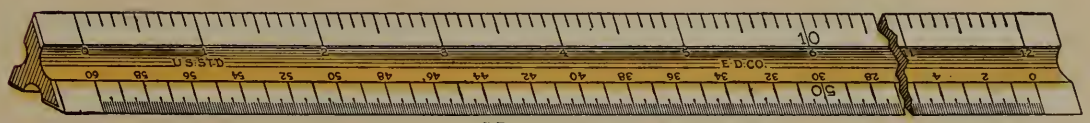
Divided: $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 in. to the foot, $\frac{1}{16}$ in.

		Each.
No. 1655.	Triangular White Edge Scale, 6 in., Regular Shape, . .	$1 50
1656.	" " " " 12 " " " " . .	2 40
1657.	" " " " 18 " " " " . .	4 50
1658.	" " " " 24 " " " " . .	6 50
1655B.	" " " " 6 " Relieved Facet Shape,	1 50
1656B.	" " " " 12 " " " " "	2 40
1657B.	" " " " 18 " " " " "	4 50
1658B.	" " " " 24 " " " " "	6 50

Divided: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, 3, 4 in. to the foot, $\frac{1}{16}$ in.

No. 1661.	Triangular White Edge Scale, 12 in., Regular Shape, . .	$2 40
1662.	" " " " 18 " " " " . .	4 50
1663.	" " " " 24 " " " " . .	6 50
1661B.	" " " " 12 " Relieved Facet Shape,	2 40
1662B.	" " " " 18 " " " " "	4 50
1663B.	" " " " 24 " " " " "	6 50

FOR CIVIL ENGINEERS AND SURVEYORS.



No. 1667.

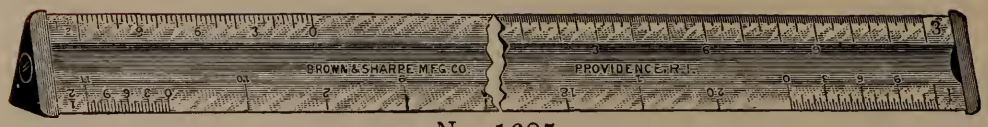
Divided: 10, 20, 30, 40, 50, 60 parts to the inch.

		Each.
No. 1665.	Triangular White Edge Chain Scale, 6 in. Regular Shape,	$1 50
1667.	" " " " " " 12 " " " "	2 40
1668.	" " " " " " 18 " " " "	4 50
1669.	" " " " " " 24 " " " "	6 50
1665B.	" " " " " " 6 " Relieved Facet Shape,	1 50
1667B.	" " " " " " 12 " " " " "	2 40
1668B.	" " " " " " 18 " " " " "	4 50
1669B.	" " " " " " 24 " " " " "	6 50
1681.	Triangular White Edge Chain Scale, 12 in., divided: 20, 30, 40, 50, 60, 80 parts to the inch, Regular Shape, . . .	2 50
1681B.	Triangular Scale, like No. 1681 but Relieved Facet Shape,	2 50
1682.	Triangular White Edge Chain Scale, 12 in., divided: 100, 200, 300, 400, 500, 600 parts to the foot, Regular Shape, . . .	2 50
1682B.	Triangular Scale, like No. 1682 but Relieved Facet Shape,	2 50

Triangular Scales with any other divisions made to order.

TRIANGULAR METALLIC SCALES

Regular Shape.



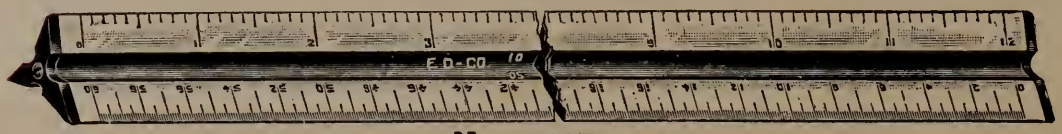
No. 1685.

No. 1685. Triangular Metallic Scale, Architects', 12 in., divided: $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 in. to the foot, $\frac{1}{16}$ in., . . Each, $2 50

1686. Triangular Metallic Chain Scale, Engineers', 12 in., divided: 10, 20, 30, 40, 50, 60 parts to the inch, . . " 2 50

1687. Triangular Metallic Chain Scale, Engineers', 12 in., divided: 20, 30, 40, 50, 60, 80 parts to the inch, . . " 2 50

Relieved Facet Shape.



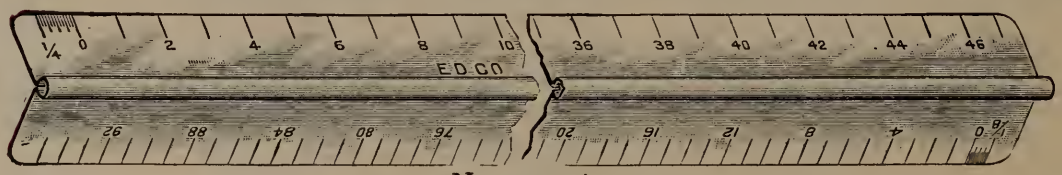
No. 1688B.

These Metallic Scales, besides having the Relieved Facet shape which affords an easier reading of the scales, have the three fillets colored respectively black, yellow and red, to facilitate finding the required division.

No. 1688A. Improved Triangular Metallic Scale, Architects', 12 in., divided: $\frac{3}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 in. to the foot, $\frac{1}{16}$ in., . . Each, $3 00

1688B. Improved Triangular Metallic Scale, Engineers', 12 in., divided: 10, 20, 30, 40, 50, 60 parts to the inch, . . " 3 00

1688C. Improved Triangular Metallic Scale, Engineers', 12 in., divided: 20, 30, 40, 50, 60, 80 parts to the inch, . . " 3 00



No. 1689A.

The form of these scales makes them very convenient for many purposes. They are made of steel, nickeled, with a dull finish; a 12 inch scale weighs 2½ ounces. Each scale has two graduations, one on each edge.

No. 1689A. Metal Scale, 12 in., div. $\frac{1}{8} \times \frac{1}{4}$ in. to the foot, . . Each, $1 25

1689B. " " 12 " " $\frac{1}{4} \times \frac{1}{2}$ " " " . . " 1 25

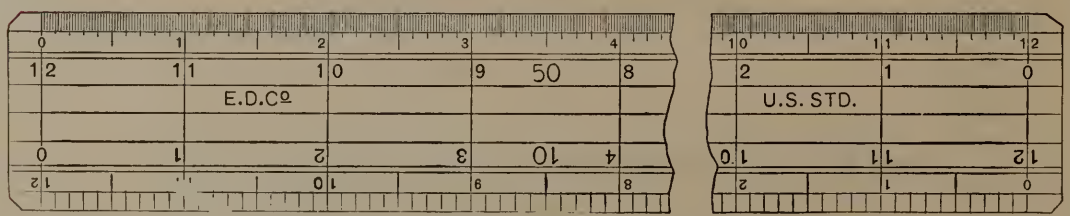
1689C. " " 12 " " $\frac{3}{8} \times \frac{3}{16}$ " " " . . " 1 25

1689D. " " 12 " " $\frac{1}{2} \times 1$ " " " . . " 1 25

1689E. " " 12 " " $\frac{3}{4} \times 1\frac{1}{2}$ " " " . . " 1 25

1689F. " " 12 " " $1\frac{1}{2} \times 3$ " " " . . " 1 25

UNDERWRITER'S SCALE

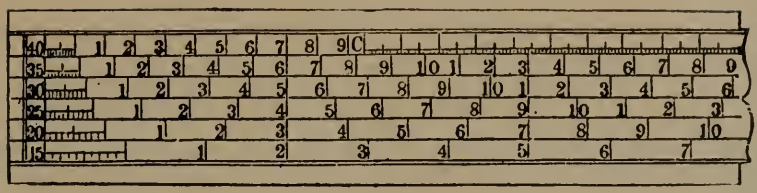


No. 1689L.

No. 1689K. Flat Transparent Ambro Underwriter's Scale, 6 in., both edges beveled and divided 10 × 50 parts to the inch, Each, $1 50

1689L. Flat Underwriter's Scale, like No. 1689K, but 12 inch, " 2 00

PLOTTING SCALES

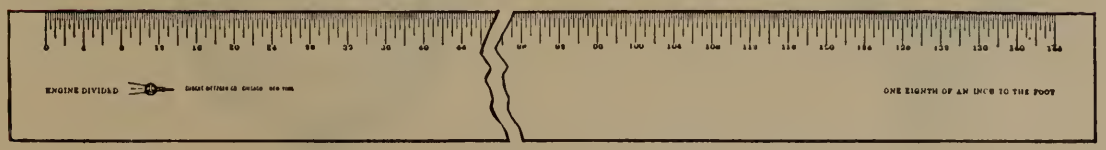


No. 1690.

No. 1690.	Boxwood Plotting Scale, 6 in., ...	Each,	$0 10
1691.	Ivory Plotting Scale, 6 in., ...	"	90

PAPER SCALES

Printed on Bristol Board. Engine Divided.



No. 1700.

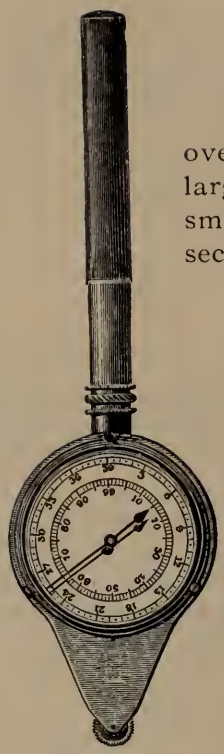
No. 1700.	Card-board Scales, 18 in. long, full divided in $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 3 inches to the foot, . . . Per set of these 8 scales,		$1 50
	Single Scales, ...	Each,	20
1704.	Card-board Scales, 18 in. long, full divided in 10, 20, 30, 40, 50, 60 parts to the inch, . . . Per set of these 6 scales,		1 10
	Single Scales, ...	Each,	20
1706.	Metric Paper Scales, $\frac{1}{2}$ meter long, divided in mm, .	"	20
1708.	Metric and Inch Comparing Scale, $\frac{1}{2}$ meter long, . .	"	30
1710.	Scale of Proportional Inches, 12 in., long, div. $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{1}$,	"	10

TRIANGULAR SCALE GUARDS

No. 1715.

No. 1715.	Triangular Scale Guard, nickel plated, ...	Each,	$0 15

MAP MEASURES



To measure it is only necessary to move the instrument over the surface. The small dial registers the feet, and the large one the inches. When 25 feet have been traversed, the small hand has made a complete revolution, and begins the second one, etc.

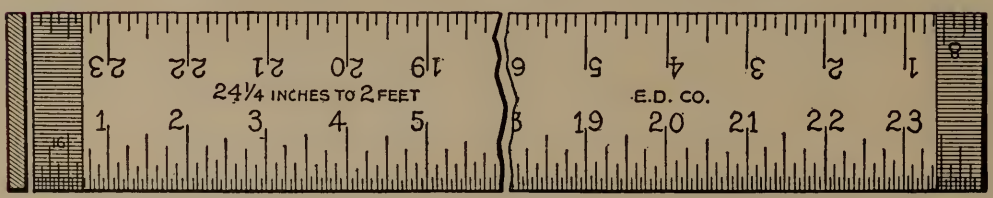
This refers to No. 1721 only.

No. 1720. 1721.

No. 1720. Universal Map Measure, with handle. The index hand registers inches to miles, or centimeters to kilometers, Each, $3 00
1721. Map Measure, watch pattern, ... " 2 00

SHRINKAGE RULES

FOR SINGLE AND DOUBLE SHRINKAGE.



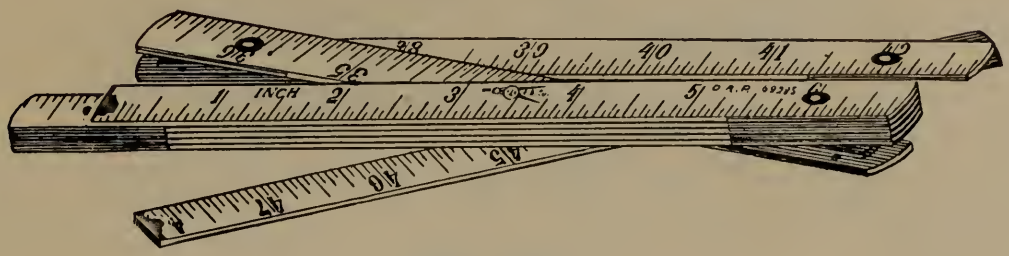
No. 1726.

These rules are of hardwood, brass tipped, about 1½ inches wide by ⅛ inch thick and divided to $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$ and $\frac{1}{16}$ inches.

No. 1725.	Shrinkage Rule,	$24\frac{2}{10}$	equal	24	inches, ...	Each, $1 20
1726.	"	" $24\frac{1}{4}$	"	24	"	" 1 20
1727.	"	" $24\frac{3}{8}$	"	24	"	" 1 20
1728.	"	" $24\frac{1}{2}$	"	24	"	" 1 20

ENGINEERS' FOLDING POCKET RULES

Yellow Finish.



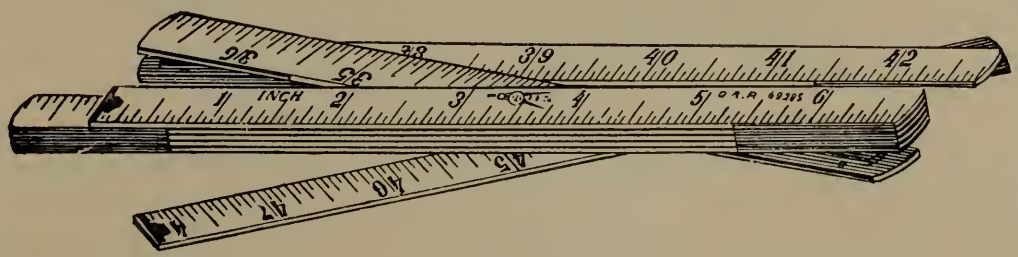
No. 1738–4.

These Pocket Rules are thin and light, and therefore more convenient than the common joint Rules. By a peculiar preparation of the wood, shrinkage is entirely prevented. They are accurate and are provided with ingenious springs which hold the Rule in a straight line when open, for easy measurement of vertical and horizontal distances. The ends are provided with brass tips.

			Each.
No. 1738–2.	Pocket Rule, 2 feet, 4 fold, div.	1/16×1/16 in., with springs,	$0 20
1738–3.	" " 3 " 6 " "	1/16×1/16 " " "	25
1738–4.	" " 4 " 8 " "	1/16×1/16 " " "	38
1738–5.	" " 5 " 10 " "	1/16×1/16 " " "	47
1738–6.	" " 6 " 12 " "	1/16×1/16 " " "	58
1738–8.	" " 8 " 16 " "	1/16×1/16 " " "	75
1738–M.	" " 4 " 8 " "	1/16×mm., " "	38

EXTRA FINE QUALITY.

Yellow Finish.



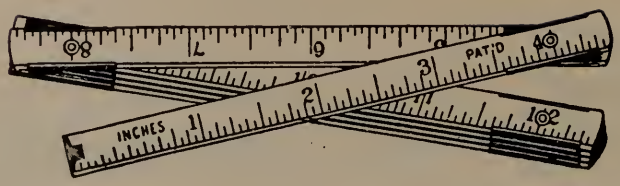
No. 1741–4.

No rivets visible on the surface that disturb the reading of the scale. The ends are provided with brass tips.

			Each.
No. 1741–2.	Pocket Rule, 2 feet, 4 fold, div.,	1/16×1/16 in., with springs,	$0 22
1741–3.	" " 3 " 6 " "	1/16×1/16 " " "	30
1741–4.	" " 4 " 8 " "	1/16×1/16 " " "	42
1741–5.	" " 5 " 10 " "	1/16×1/16 " " "	50
1741–6.	" " 6 " 12 " "	1/16×1/16 " " "	65
1741–8.	" " 8 " 16 " "	1/16×1/16 " " "	85
1741–M.	" " 4 " 8 " "	1/16×mm., " "	42
1741–T.	" " 4 " 8 " "	1/16 × 1/100 ft., " "	42

FOLDING POCKET RULES *Continued*

VEST POCKET SIZE



No. 1743-2.

YELLOW FINISH.

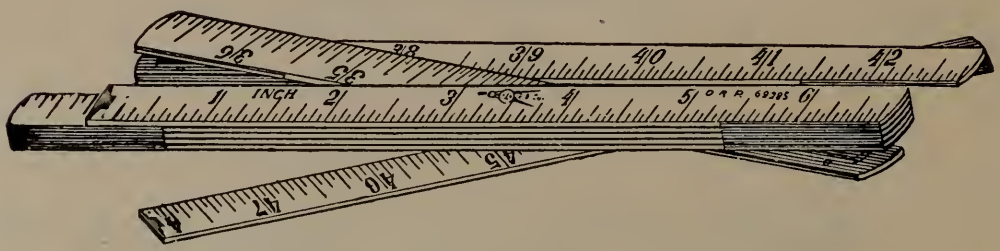
No. 1743-2.	Pocket Rule, 2 feet, 6 fold, $\frac{1}{16} \times \frac{1}{16}$ in., with springs,	Each,	$0	25
1743-3.	" " 3 " 9 " $\frac{1}{16} \times \frac{1}{16}$ " " " "			40
1743-M.	" " 1 meter, 10 " $\frac{1}{16} \times$ mm. " " " "			55

WHITE ENAMELED.

No. 1744-2.	Pocket Rule, 2 feet, 6 fold, $\frac{1}{16} \times \frac{1}{16}$ in., with springs,	Each,	$0	45
1744-3.	" " 3 " 9 " $\frac{1}{16} \times \frac{1}{16}$ " " " "			55
1744-M.	" " 1 meter, 10 " $\frac{1}{16} \times$ mm. " " " "			70

Rules Nos. 1743–1744 are only $\frac{3}{8}$ in. wide. The 3-foot Rule measures only $\frac{3}{8} \times \frac{9}{16} \times 5$ inches when closed. Very convenient for the pocket.

WHITE ENAMELED



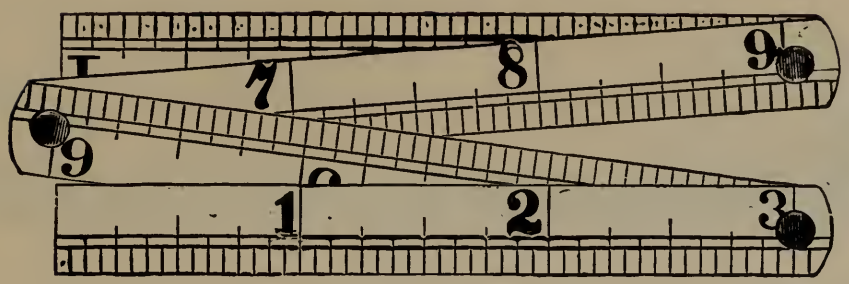
No. 1745-4.

These Folding Pocket Rules are similar in construction to those listed under No. 1741, differing only in the finish. They have a white coating which is very durable and resists heat or moisture. The black graduations are more legible than on the yellow rules, and as our improved white finish rules can be cleaned with water, oil or alcohol, their neat appearance can thus be preserved.

No rivets visible on the surface that disturb the reading of the scale. The ends are provided with brass tips.

				Each.	
No. 1745-2.	Pocket Rule, 2 feet, 4 fold, div. $\frac{1}{16} \times \frac{1}{16}$ in., with springs,	$0	35
1745-3.	" " 3 " 6 " " " $\frac{1}{16} \times \frac{1}{16}$ " " "			45
1745-4.	" " 4 " 8 " " " $\frac{1}{16} \times \frac{1}{16}$ " " "			60
1745-5	" " 5 " 10 " " " $\frac{1}{16} \times \frac{1}{16}$ " " "			70
1745-6.	" " 6 " 12 " " " $\frac{1}{16} \times \frac{1}{16}$ " " "			85
1745-8.	" " 8 " 16 " " " $\frac{1}{16} \times \frac{1}{16}$ " " "		1	15
1745-M.	" " 4 " 8 " " " $\frac{1}{16} \times$ mm., " "			60
1745-T.	" " 4 " 8 " " " $\frac{1}{16} \times \frac{1}{100}$ ft., " "			60

FOLDING STEEL POCKET RULES

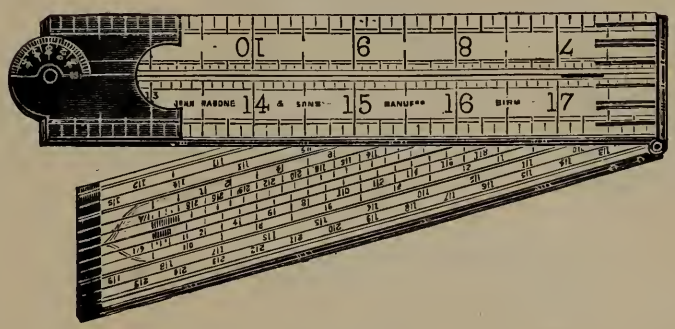


No. 1746-1.

All our Steel Rules being made of hardened steel, the corners and edges will not wear off, and the figures and divisions are always plain. They are made of spring steel, $\frac{3}{8}$ in. wide, graduated on both sides, and will bend to a 3-inch circle. Can be conveniently carried in the vest pocket.

No. 1746-1.	Steel Pocket Rule, 1 foot, 4 fold, div. $\frac{1}{16} \times \frac{1}{16}$ in., Each,	$0 25
1746-2.	" " " 2 " 8 " " $\frac{1}{16} \times \frac{1}{16}$ " "	50
1746-3.	" " " 3 " 12 " " $\frac{1}{16} \times \frac{1}{16}$ " "	75
1746A.	Leather Sheaths for Rules, No. 1746-1, ... "	10
1746B.	" " " " No. 1746-2, ... "	12
1746C.	" " " " No. 1746-3, ... "	15

SCALE RULES



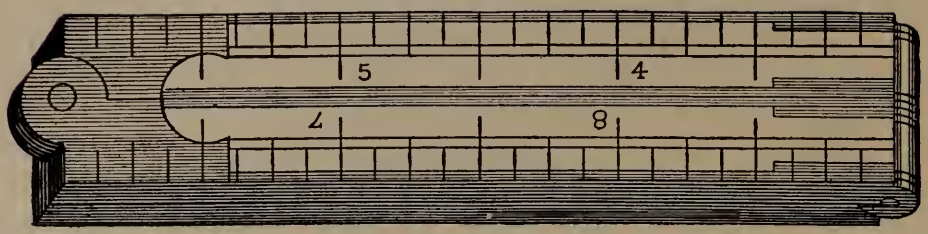
No. 1747.

No. 1747. Ivory Joint Rule, 2 feet, 4 fold; German silver mounted, divided $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{16}$ in.; outside edge foot in 100ths. The inside edges are beveled and divided $\frac{1}{16}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ inches to the foot. The main joint is graduated to 5 degrees, for setting off angles, ... Each, $7 80

1748. Boxwood Joint Rule, 2 feet, 4 fold; German silver mounted, divided like No. 1747, ... Each, 2 10

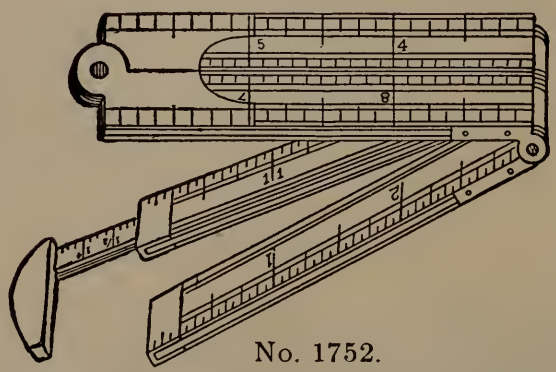
1749. Boxwood Joint Rule, 2 feet, 4 fold; Brass mounted, with scales on beveled edges of $\frac{1}{16}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 inch to the foot. The main joint is graduated at 45, 60 and 90 degrees, Each, ... 1 35

POCKET RULES



No. 1750C.

		Each.
No. 1750A.	Pocket Rule, Boxwood, 1 foot, 4 fold, brass mountings, .	$0 12
1750B.	" " " 2 " 4 " " " .	15
1750C.	" " " 1 " 4 " brass-bound edges,	35
1750D.	" " " 2 " 4 " " "	50
1751E.	Pocket Rule, Ivory, 1 foot, 4 fold, German silver mountings,	1 00
1751F.	" " " 2 " 4 " " "	3 75
1751G.	" " " 1 " 4 " " bound edges,	2 00
1751H.	" " " 2 " 4 " " "	5 00



No. 1752.

No. 1752.	Pocket Rule, Boxwood, with Caliper, 1 foot, 4 fold, brass-bound edges, ... Each,	$0 60
1753.	Pocket Rule, Ivory, with Caliper, 1 foot, 4 fold, German silver bound edges, ... Each,	3 50

EXTENSION MEASURES

These Measures are of hardwood with brass trimmings, and are graduated to feet, inches and eighths. They are used for measuring floors, walls and windows; also objects which are not accessible for measuring with a tape.

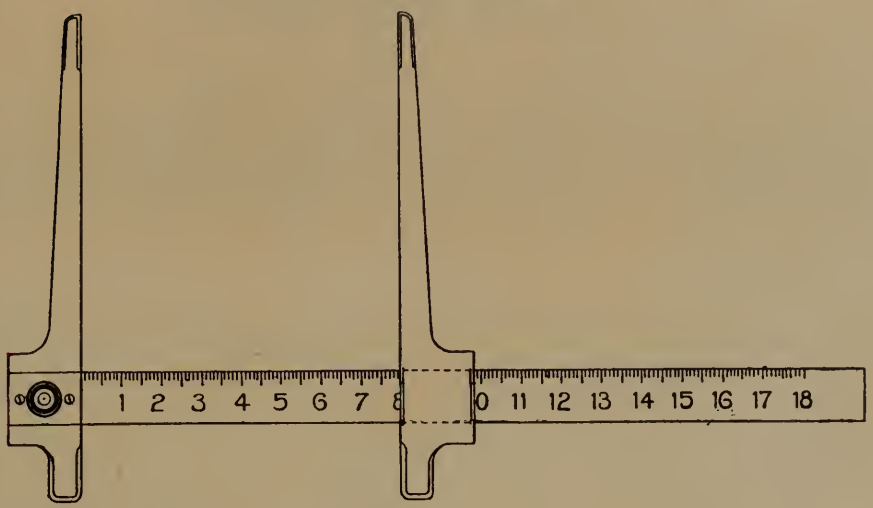
No. 1756.

No. 1756A.	Extension Measure,	2	fold,	4	feet,	extending to	8	feet,	Each,	$3 50
1756B.	"	2	"	5	"	"	10	"	"	4 00
1756C.	"	2	"	6	"	"	12	"	"	5 00

No. 1757.

No. 1757D.	Extension Measure,	3	fold,	3	feet,	extending to	9	feet,	Each,	$5 00
1757E.	"	3	"	4	"	"	12	"	"	6 00
1757F.	"	3	"	5	"	"	15	"	"	7 50

FORESTERS' CALIPERS



No. 1758A.

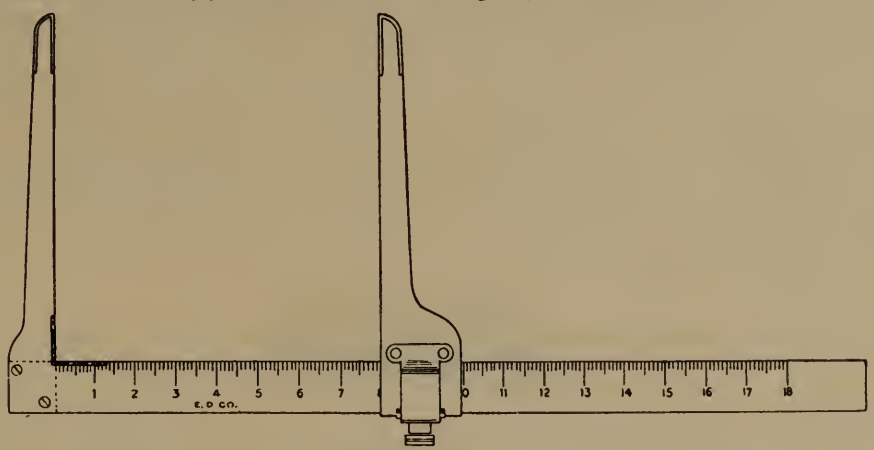
No. 1758A.	Tree Caliper, fine Hardwood,	18 in.,	1	clamp nut,	Each,	$3	15
1758B.	" " " "	24 "	2	" "	"	3	65
1758C.	" " " "	30 "	2	" "	"	4	15
1758D.	" " " "	50 "	2	" "	"	5	45

These calipers are of fine seasoned hardwood, best workmanship, both sides of beam graduated to 10ths inches and plainly numbered. The arms are removable for convenience in transportation. The stationary arm is held by brass clamp nuts with lock nut. The eye of sliding arm is brass lined all around.

Other lengths made to order.

No. 1758G.	Tree Caliper with folding arms, fine Hardwood,	30 in.,	Each,	$5	00
1758H.	" " " " " " "	50 "	"	6	00

Made of fine seasoned hardwood, both sides of beam graduated to 10ths inches and plainly numbered. The arms are attached to solid brass mountings and are held in position by clamp nuts. The sliding arm is provided with a second clamp on the opposite side for clamping it on the beam.



No. 1759A.

			Each.
No. 1759A.	Marking Caliper, with one fixed arm, fine Hardwood,	18 in.,	$3 00
1759B.	" " " " " " " "	24 "	3 50
1759C.	" " " " " " " "	30 "	4 00
1759D.	" " " " " " " "	50 "	5 25

Made of fine seasoned hardwood, both sides of beam graduated to 10ths inches and numbered, brass mountings. One arm is fixed and the sliding arm is provided with set screw.

THE SLIDE RULE

The Slide Rule is an instrument for solving all problems involving multiplication and division and powers and roots without the mental effort and waste of time necessary by the usual processes of arithmetic. Some idea of the saving of time effected by the rule may be gained from the fact that $2.13 \times 3.67^2 \div 1.23$ can be solved as quickly as $2 \times 3^2 \div 5$, and either of them much quicker than by the usual process.

The principles to be mastered are few and simple, and a little practice with the rule will convince any one who has much calculating to do, of the folly of doing with the brain what can better and more quickly be done with the rule.

After the elementary rules for operation are acquired, a little practice will make the setting and reading of the rule automatic, as it were, and the rules can be dropped out of mind.

The usefulness of the slide rule is not confined to the work of the engineer, but may be appropriated with equal advantage by the accountant, merchant, importer, manufacturer, auditor, freight agent, passenger agent, and in fact by anyone called upon to perform calculations of any kind.

A knowledge of the principles which underlie the workings of the slide rule is not necessary for its successful operation, but an exhaustive, though brief, explanation of the subject will be found in "The Slide Rule," by E. M. Scofield, and in "Mannheim and Multiplex Slide Rules," by L. W. Rosenthal. These books are published by us and will be found listed under Nos. 1775A-1775B.

The Mannheim slide rule was arranged by Lieut. Mannheim, and our improved forms will be found listed on the following pages. As is well known, the ordinary Mannheim slide rule is seldom perfect as regards its mechanical working, and if so, is liable to become warped or shrunken so that the movement of the slide is imperfect. When they get in this condition there is no method of restoring them to perfect working, and they become worthless.

We overcome these objectionable features in our improved Slide Rules, among which we illustrate below the construction of our **"Multiplex"** and **"Mack"** Rules, which differ from some other so-called "improved" Slide Rules, in that it is not necessary to use a screw-driver each time atmospheric conditions change, as **our improved Patent Slide Rules adjust themselves automatically.**

Cross Section of the Multiplex and Mack Improved Slide Rules.

Illustration full size.

For full description and prices, see following pages.

THE MULTIPLEX SLIDE RULE

Patented Aug. 9, 1904.

WITH OUR IMPROVED PATENTED AUTOMATIC ADJUSTMENT.

No. 1762B.

The "Multiplex" is the most perfect acting and durable of all slide rules and represents the only important advance which has been made in the art since the advent of the Mannheim types. Not only does it broaden the field of application, but it also offers a convenient means of more rapid working, securing greater accuracy at the same time. The theoretical and mechanical principles upon which the Multiplex Slide Rule is based, are identical in all respects to those underlying the action of the ordinary Mannheim rules, so that the operator has but little more to learn, although there is much to be gained.

Not only does the Multiplex solve all arithmetical, trigonometrical and logarithmic examples which are possible with the Mannheim, and in the same convenient and rapid manner, but it further possesses the following characteristic advantages:

1. Multiplication of three numbers in one setting.
2. Division of one number by two numbers in one setting.
3. More convenient solution of inverse proportion.
4. Direct solution in a single setting of a series of divisions with a constant dividend.
5. Direct reading of cubes and cube roots.
6. Direct reading of three-halves and two-thirds powers.
7. Direct solution in a single setting of many combined operations which require the slide to be shifted with the Mannheim rule.

The only change on the face of the rule from the ordinary Mannheim type is the substitution of a reversed or *reciprocal scale* for one of the upper scales on the slide. This scale is of the same length and division as the one replaced. It introduces no complication whatever and does not in any way subtract from the operations possible with the other types of rules.

In addition to the above, the rules are provided with a *cube scale*, which is not located on the face of the rule. Hence this arrangement does not confuse the operator in the solution of ordinary problems, but gives the same clear reading surface that is found on the Mannheim rules. The cube scale makes it possible to obtain direct readings in a single setting of cubes, cube roots, three-halves and two-thirds powers, besides broadening the field of application in a great measure with a corresponding saving in time and an increase of accuracy.

By combining the ordinary scales with the reciprocal and cube scales, as the Multiplex Rule does, ninety-three separate and distinct solutions of practical problems are secured in a single setting against about one-third that number for the Mannheim Rule.

A Manual or Book of Instructions by L. W. Rosenthal accompanies each Multiplex Rule, giving to the beginners the elements of the subject necessary for the proper understanding of theory and practical application of the Mannheim and Multiplex Slide Rules. In it the attempt was made to include a simple but thorough explanation with examples of every application of the slide rule that is useful to the Engineer or Student. There has also been added to the text a large amount of useful data and conversion tables applicable to slide rules.

No. 1762A.	Multiplex Slide Rule, with Cube and Reciprocal Scales, 5 in., divisions on white ivorine, glass Indicator and our Patented Adjustment, in case, with Book of Instructions, ... Each,	$	5 00
1762AL.	Multiplex Slide Rule, like No. 1762A, but 8 in., "		5 00
1762B.	" " " " " " 10 " "		5 00
1762BL.	" " " " " " 16 " "		10 50
1762C.	" " " " " " 20 " "		15 00
1763A.	Multiplex Slide Rule, with Reciprocal Scale but no Cube Scale, 5 in., divisions on white ivorine, glass Indicator and our Patented Adjustment, in case, with Book of Instructions, ... Each,	$	4 50
1763AL	Multiplex Slide Rule, like No. 1763A, but 8 in., "		4 50
1763B.	" " " " " " 10 " "		4 50
1763BL.	" " " " " " 16 " "		10 00
1763C.	" " " " " " 20 " "		14 50

The Multiplex Rule without the Cube Scale is best adapted for those who do not require the solution of the more complex problems involving powers and roots. This rule will be found to possess many important advantages over the ordinary Mannheim rules, although it is not of such wide application as the Multiplex Rule with the Cube Scale.

THE MACK IMPROVED SLIDE RULE

Patented June 28, 1898.

No. 1765.

No. 1764.	Mack Improved Slide Rule (Mannheim), 5 in., divisions on white ivorine, glass Indicator, in case, with Directions, ... Each,	$ 4	50
1764L.	Mack Improved Slide Rule (Mannheim), 8 in., divisions on white ivorine, glass Indicator, in case, with Directions, ... Each,	4	50
1765.	Mack Improved Slide Rule (Mannheim), 10 in., divisions on white ivorine, glass Indicator, in case, with Directions, ... Each,	4	50
1765L.	Mack Improved Slide Rule (Mannheim), 16 in., divisions on white ivorine, glass Indicator, in case, with Directions, ... Each,	10	00
1767.	Mack Improved Slide Rule (Mannheim), 20 in., divisions on white ivorine, glass Indicator, in case, with Directions, ... Each,	14	50

A closer reading is obtained on the 16 and 20 inch Rules, as the sub-division of the scales is carried much further, which also greatly facilitates the ready reading of the various scales.

The Mack Rule is divided longitudinally into two parts, and these parts have a slight parallel motion as regards each other, which is accomplished by means of suitable guide pins, these pins also maintaining the upper and lower scales, or A and D, in perfect register.

The two parts of the rule are drawn together by a number of small springs, distributed along the length of the rule, a series of stops limiting the motion of the parts so that when the slide is withdrawn its space in the rule is only about 1-100th of an inch narrower than the slide itself.

As the friction of the slide in the rule is produced by spring pressure, its resistance is uniform throughout its travel, even to the last quarter of an inch, and this feature alone makes it as superior to the ordinary form as our modern pivot joint compass is to the old hinge joint pattern.

The Mack Rule has also the marked advantage over former constructions in that if the parts become warped they may be straightened by scraping, as the spring pressure will compensate any difference in width of the slide, or deviation in the parallelism of its edges.

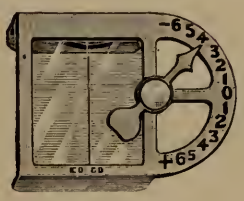
All the guide pins, springs and stops are concealed within the body of the rule, the only visible difference between this and ordinary slide rules being a fine longitudinal slit, while its advantages in working and durability are manifest.

As will be noted by above description, atmospheric changes which are liable to render the ordinary Mannheim Rule worthless, do not interfere at all with the perfect working of the Mack improved form.

The Mack Improved Slide Rule adjusts itself automatically.

SUNDRIES FOR "MULTIPLEX" AND "MACK" SLIDE RULES

No. 1773B.



1773D.

No. 1773A.	Glass Indicator with one hairline (as furnished with Rules)	Each,	$0 50
1773B.	Glass Indicator with two hairlines, ...	"	70
1773D.	" " " Decimal Pointer, one hairline,	"	1 00
1773M.	Magnifier, mounted on the Indicator.	Extra,	2 50

SOLE LEATHER CASES FOR SLIDE RULES

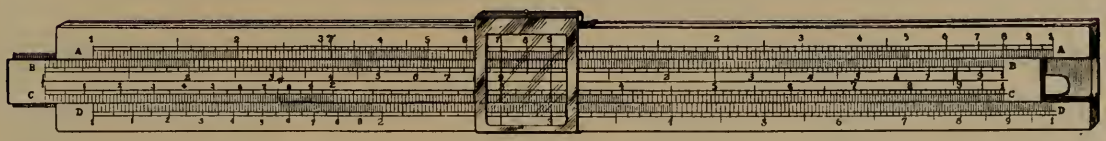
No. 1774-5.	Sole Leather Case for 5 inch Slide Rules, . .	Each,	$0 60
1774-8.	" " " " 8 " " " . .	"	70
1774-10.	" " " " 10 " " " . .	"	80
1774-16.	" " " " 16 " " " .	"	1 00
1774-20.	" " " " 20 " " " . .	"	1 25

BOOKS OF INSTRUCTION FOR SLIDE RULES

No. 1775A.	"The Slide Rule" by E. M. Scofield, 24 pages (furnished free with "Mack" and "Union" Rules) . .	Each,	$0 25
1775B.	"Mannheim and Multiplex Slide Rules." Theory and practical application, by L. W. Rosenthal, 59 pages (furnished free with "Multiplex" Rules)	Each,	50

THE UNION SLIDE RULE

Patented Feb. 25, 1902.



No. 1777.

No. 1776.	The Union Slide Rule (Mannheim), 5 in., divisions on white ivorine with glass Indicator. Printed instructions with Rule, ...	Each,	$3 30
1777.	The Union Slide Rule (Mannheim), 10 in., divisions on white ivorine with glass Indicator. Printed instructions with Rule, ...	Each,	3 60

The difficulty experienced with all the regular Slide Rules up to the present time, has been the unsatisfactory working of the slide, which is principally due to the shrinking and warping of the wood to which the divided scales are cemented.

In the Union Slide Rule all these difficulties have been obviated by an ingenious method of attaching the scales A and D to a flexible back, substantially of the same material as the face of slide and scales, thus insuring a uniform expansion and contraction under all conditions of atmospheric changes, thereby maintaining a true and smoothly working slide at all times.

The back of the rule has a scale of decimeters and millimeters on one edge, and inches and sixteenths on the other

Nearly all visible parts of the rule are of white ivorine, thus showing the graduations in a distinct and legible way and giving the instrument a very neat and attractive appearance.

A. W. FABER'S SLIDE RULES

No 1780. Faber's Slide Rule, 10 in., white celluloid surface, glass Indicator, with directions, ... Each, $3 75

1781. Faber's Slide Rule, 10 in., with self-adjusting slide, white celluloid surface, glass Indicator, with directions, . Each, 4 25

1782. Faber's Slide Rule, 10 in., like No. 1781, but without lateral lines, with directions, ... Each, 4 25

1783. Faber's Slide Rule, 10 in., with self-adjusting slide and Digit Indicator, white celluloid surface, with directions, . Each, 5 00

1784. Faber's Slide Rule, 20 in., with self-adjusting slide and Digit Indicator, white celluloid surface, with directions, . Each, 16 00

SEXTON'S OMNIMETRE

Functions: Logarithms, Numbers, Squares, Square Roots, Cubes, Cube Roots, Sines, Tangents, Versed Sines, Secants.

No. 1786C.

No. 1786A. Sexton's Omnimetre No. 1, diam., 7¼ inches, Bristol Board Discs, Readings from edge of runner. . . . . Each, $1 00

No. 1786B. Sexton's Omnimetre No. 2, diam., 7¼ inches, Non-absorbent Card Discs, Readings from hair-lined runner. Lower disc perforated to facilitate manipulation, . . Each, $2 00

No. 1786C. Sexton's Omnimetre No. 3, diam., 7 inches, Non-absorbent Bristol Board Discs. Readings from hair-lined runner. Lower disc perforated to facilitate manipulation. Milled nut to clamp discs in position when required. Character of graduations gives increased ease of reading. Additional functions, fifth powers and fifth roots, . . . Each, $3 00

No. 1786D. Companion Instrument, No. 6, diam., 6⅛ inches. This instrument consists of a card board disc, a transparent disc, and a transparent runner. Printed upon the card board disc is a logarithmic scale about 13½ feet long, arranged in circles. The instrument is intended as a companion to the Omnimetre (although it will answer as a companion to the straight slide rule as well) for those who wish to read accurately, at least four figures in the answers to problems of multiplication and division, Each, $2 00

THE ENGINEERS' SLIDE RULE

Patented July 2, 1901.

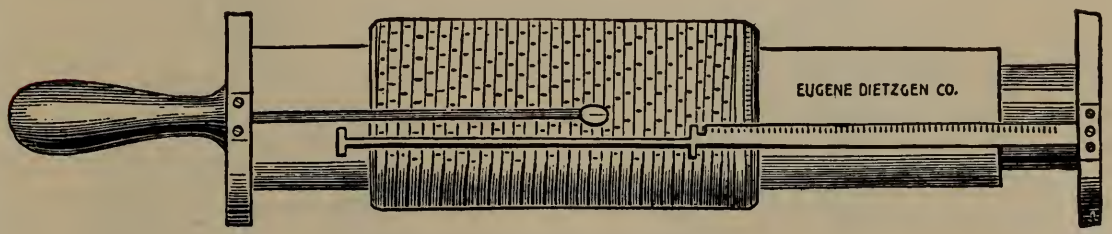
No. 1787.

No. 1787. The Engineers' Slide Rule, 24 in., Hardwood, with directions,
Each, $5 00

This is an improved slide rule, arranged by Edwin Thacher and E. M. Scofield, Bridge Engineers, in order to combine a maximum of speed with a maximum of accuracy. It is 24 inches long and comprises two complete rules upon one stick.

It multiplies three numbers at one setting, gives powers and roots and has an accuracy equal to a 48 inch rule for ordinary work. No runner is required. Directions for using same are engraved on each rule.

FULLER'S SLIDE RULE



No. 1794.

No. 1794. Fuller's Spiral Slide Rule, in mahogany box, with directions,
Each, $30 00

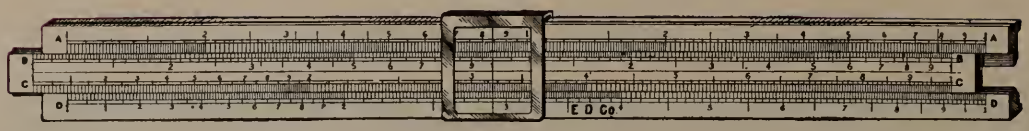
This form of calculating machine, which is the simplest yet made, facilitates very greatly the numerous arithmetical calculations required in the office of the Engineer, Architect and Actuary.

Its range is greater than that of most arithmetical machines, as, besides the operations of multiplication and division which many instruments can only perform, results requiring the reciprocals, powers, roots, or logarithms of numbers, can be quickly and easily obtained by its use.

The rule consists of a cylinder that can be moved up and down upon, and turned round, an axis, the latter being held by a handle. Upon this cylinder is wound in a spiral a single logarithmic scale. Fixed to the handle is an index. Two other indices, whose distance apart is the axial length of the complete spiral, are fixed to an inner cylinder. This inner cylinder slides inside the axis like a telescope tube, and thus enables the operator to place these indices in any required position relative to the logarithmic scale. Two stops are so fixed that when they are brought in contact the index points to the commencement of the scale.

The use of slide rules has been confined to roughly approximate calculations, as the length of scale hitherto made was sufficient only for about 160 divisions. In the new rule the length of scale is 500 inches and the number of divisions 7,250, consequently the approximation obtained by its use is sufficient for most of the calculations required by Engineers and Architects, and for many of those required by Actuaries.

COLLEGE SLIDE RULE

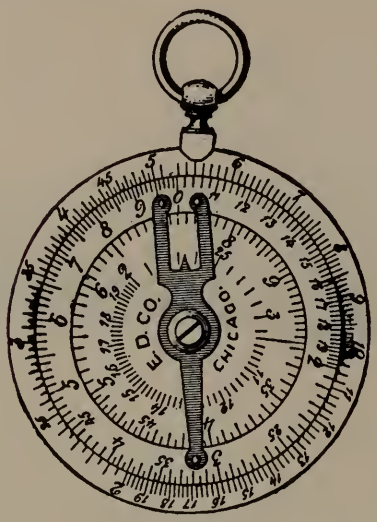


No. 1795.

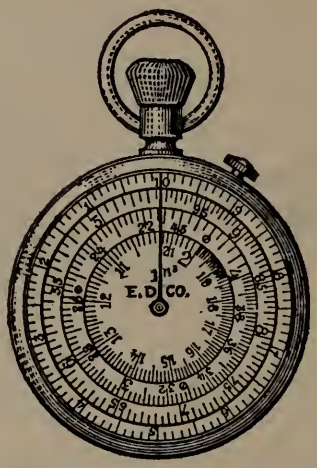
No. 1795. College Slide Rule (Mannheim), 10 in., Hardwood, divisions on white paper, with glass indicator and directions, . Each, $1 25

The College Slide Rule is similar in graduations to the Mack Improved and Union Slide Rules and is intended for the use of students, enabling them to become familiar with the latter at no great expense.

CHARPENTIER AND BOUCHER CALCULATORS



No. 1796.



1797.

No. 1796. Charpentier Calculator, ... Each, $5 00

The Charpentier Calculator is a circular Slide Rule, $2\frac{3}{8}$ in. diameter, with a circular slide which is revolved and set by the handle. This instrument reads scale against scale like the ordinary slide rule, and being made of metal, is but slightly affected by atmospheric variations. Square roots, sines and tangents as well as logarithms may be found with it, and as the circular scale is equivalent to a straight one $5\frac{7}{8}$ in. long, results may be read off with a fair degree of accuracy. The small dimensions and light weight of the instrument make it a most useful pocket companion.

No. 1797. Boucher Calculator, enameled cardboard dials, . Each, $8 50
1797½. " " silvered metal dials, . . . " 14 00

The Boucher Calculator is made similar to an ordinary stem-winding watch, with glass covered dials back and front. Ratios are set off by means of pointers which, as well as the movable dial, are moved by means of the "stem-winder" key. It is $2\frac{1}{16}$ inches in diameter by $\frac{9}{16}$ inches thick, and does not take up more room in the pocket than an ordinary watch.

BUNZEL RECKONING MACHINES

No. 1798B.

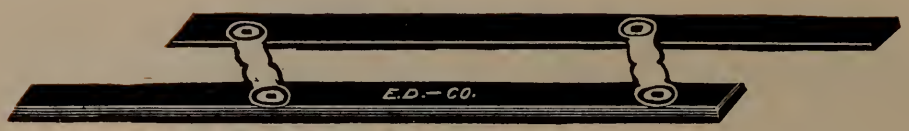
This Reckoning Machine is of simple, reliable and durable construction, and will retain its efficiency and accuracy indefinitely. Any calculations embracing Addition, Subtraction, Multiplication, Division, Powers or Roots can be performed by its aid in a very small fraction of the time required by any other method, and the results are **absolutely correct.** The tedious and tiresome part of mathematical computations is entirely removed, and the user can compute the most difficult problems steadily for weeks without fatigue.

The computations are performed by setting the shifters in the grooves and then turning the handle. The machine will multiply two factors, each of which may have as many figures as there are grooves. The labor involved in computing any mathematical problem within the scope of the machine is reduced to a minimum. A large number of these machines are now being used in this country and in Europe and they are giving general satisfaction. Each machine is guaranteed to be free from defects in workmanship and material.

No. 1798A.	Reckoning Machine, 6 grooves, 12 holes in upper row, ...	Each,	$225 00
1798B.	Reckoning Machine, 8 grooves, 16 holes in upper row, ...	Each,	276 00
1798C.	Reckoning Machine, 10 grooves, 20 holes in upper row, ...	Each,	345 00

Complete instructions furnished with each machine.

PARALLEL RULES



Nos. 1800–1811.

		Best quality.
No. 1800.	Ebony Parallel Rules, brass bars, 6 in., ... Each,	$0 30
1801.	" " " " " 9 " . . . . "	60
1802.	" " " " " 12 " . . . . "	75
1803.	" " " " " 15 " . . . . "	90
1804.	" " " " " 18 " . . . . "	1 20
1805.	" " " " " 24 " . . . . "	2 10
1806.	Rubber Parallel Rules, nickel-plated bars, 6 in., . "	75
1807.	" " " " " 9 " . "	90
1808.	" " " " " 12 " . "	1 20
1809.	" " " " " 15 " . "	1 50
1810.	" " " " " 18 " . "	1 80
1811.	" " " " " 24 " . "	2 40

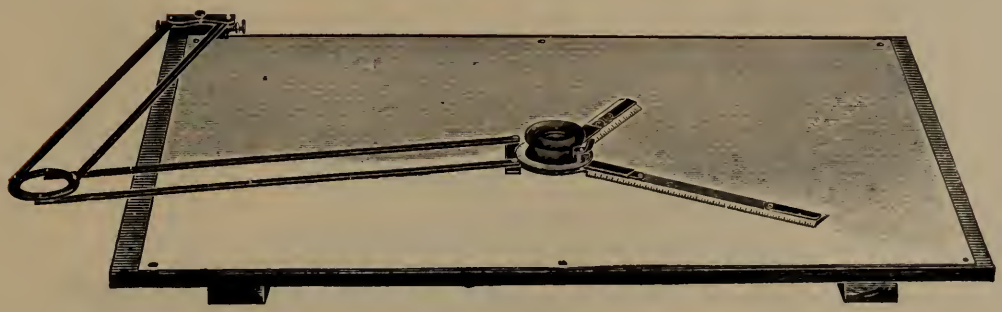
Nos. 1820–1823.

No. 1820.	Ebony Rolling Parallel Rules, brass mountings, 9 in., Each,	$2 70
1821.	" " " " " " 12 " "	3 30
1822.	" " " " " " 15 " "	3 90
1823.	" " " " " " 18 " "	4 80

Nos. 1841–1855.

No. 1841.	Solid Brass, fine finish, Rolling Parallel Rule, 9 in., Each,	$ 7 25
1842.	" " " " " " " 12 " "	8 50
1843.	" " " " " " " 15 " "	10 00
1844.	" " " " " " " 18 " "	12 00
1845.	" " " " " " " 24 " "	18 00
1851.	Solid German Silver Rolling Parallel Rule, 9 in., "	8 50
1852.	" " " " " " 12 " "	10 00
1853.	" " " " " " 15 " "	12 00
1854.	" " " " " " 18 " "	15 00
1855.	" " " " " " 24 " "	20 00

THE UNIVERSAL DRAFTING MACHINE



No. 1857.

This drafting machine consists of a graduated square having an accurate parallel motion about the drawing-board. The square is adopted because the work in most drawings consists of sets of lines at right angles. Both blades of the square are graduated for drawing and measuring lines at the same time.

The blades of the square chuck into place; interchangeable. Any length and any scale supplied.

A straight edge is provided for inking. It may also be used for long lines. This, however, is not necessary, as lines may be quickly and accurately extended with the square.

The parallel motion is obtained by means of two pivoted parallelograms, which constitute an arm joining the square to the board. This arm is made flexible, allowing the blades to lie flat upon the drawing. It is hinged at the connection to the board, and may be easily lifted out of the way of the paper. It may be readily changed from one board to another. The square is moved about the board as easily as though it were not joined to the arm.

A conveniently adjusted protractor makes the machine universal. It allows the square to be quickly set at any angle. This makes all angular work just as easy, as rapid and as accurate as straight work. Spring stops at 30°, 45° and 60° are provided, allowing the square to be instantly set at these frequent angles.

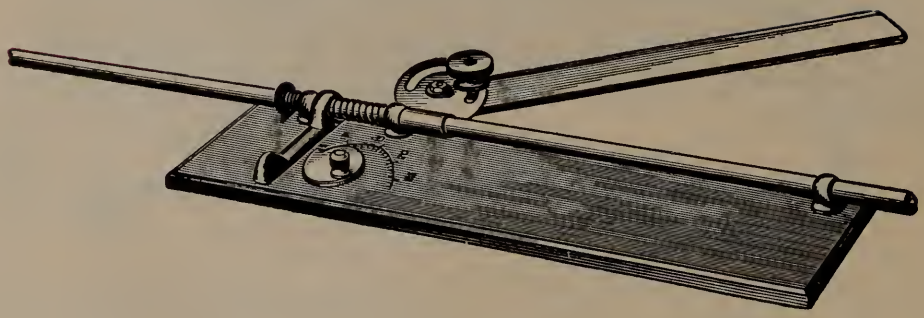
No. 1857.	Universal Drafting Machine, for drawings up to 18×24 in., with one each 6 and 12 in. White Edge Scales divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 in. to the foot, and one each 6 and 12 in. White Edge Scales divided $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 in. to the foot, and one 24 in. ebony lined straight edge for inking, ... Each,	$37 50
1858.	Universal Drafting Machine, for drawings up to 30×36 in., with one each 12 and 18 in. White Edge Scales divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 in. to the foot, and one each 12 and 18 in. White Edge Scales divided $\frac{3}{8}$, $\frac{3}{4}$, $1\frac{1}{2}$, 3 in. to the foot, and one 24 in. ebony lined straight edge for inking, ... Each,	41 25
1859.	Universal Drafting Machine, for drawings up to 32×42 in., otherwise same as No. 1858, ... Each,	41 25

The Drawing Board should preferably be 6 to 7 in. longer than the drawing, but when this is not the case, we supply an extension bar for 75 cents.

Straight Edges and Scales of other material, size or graduation made to order.

SECTION LINERS

THE PRACTICAL SECTION LINER



No. 1864.

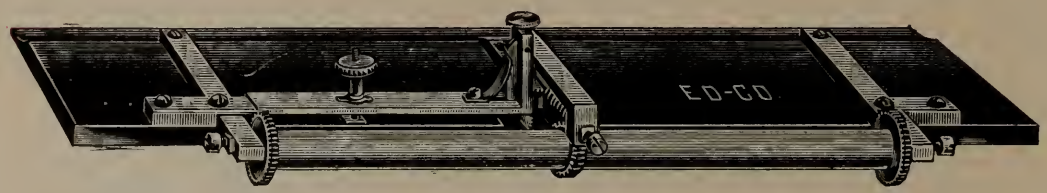
No. 1864. Practical Section Liner, of Hardwood with nickel plated mountings, blade 9 inches long, in case, . . . Each, $1 50

Strong, simple and durable. Great range of work, allowing space from 1-1000 to ½ inch, at any angle, without changing position.

Retains its place on the board by means of pins in the bottom of base and without the aid of T-square, straight-edge, hands, or weights

The only practical instrument at a reasonable price adapted to the needs of draughtsmen and pupils in mechanical and architectural drawing classes.

RICHTER SECTION LINER



No. 1866.

No. 1866. Richter Section Liner, 10 in., of German silver, with ebony straight edge, in case, ... Each, $7 00

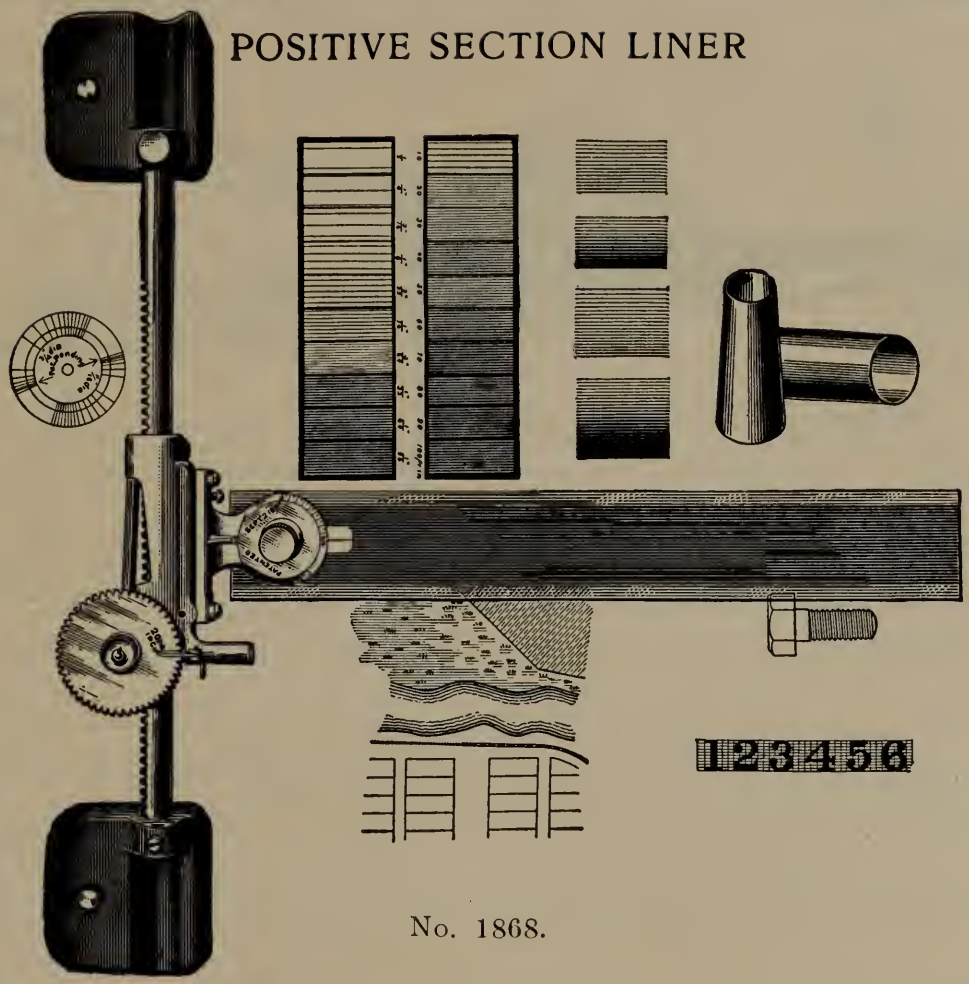
1867. Richter Section Liner, 10 in., like No. 1866, but with German silver straight edge and scale on rack for regulating space between lines, in case, ... Each, 8 50

This instrument is operated with one finger of the left hand by pressing upon set screw on top of the movable lever and not releasing same until line is drawn. The distance between the lines is determined by the adjusting screw in center of spring lever. The instrument is absolutely accurate and easily operated, no practice being required.

SECTION LINERS

Continued

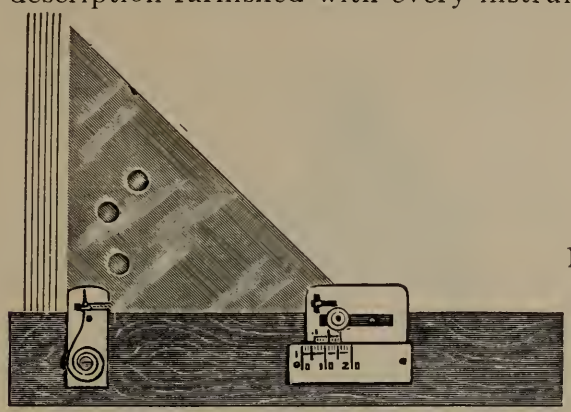
POSITIVE SECTION LINER



No. 1868.

		Each.
No. 1868.	Positive Section Liner, transparent ambro lined blade 12 in. long,	$6 50
1869.	Positive Section Liner, like No. 1868, blade 14 inches long,	7 50

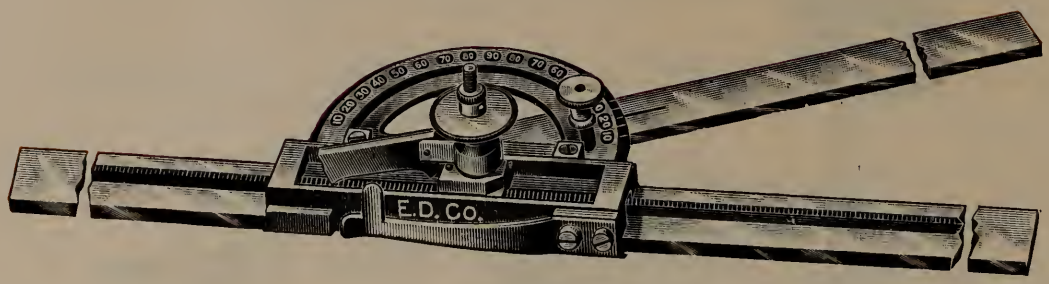
Full description furnished with every instrument.



No. 1873.

No. 1873. Patent Section Liner, triangle of transparent ambro, straight edge of hardwood, German silver mountings; a very reliable and simple instrument, which requires hardly any practice to manipulate it. By the scale and vernier the smallest distances can be regulated, ... Each, $3 50

SECTION LINER AND SCALE DIVIDER



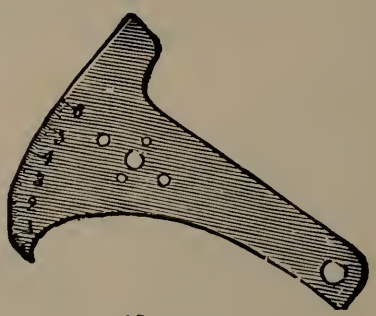
No. 1874A.

No. 1874A. Section Liner and Scale Divider, German Silver, base 14¾ in., rack 9 in., with arm projecting 10 inches beyond protractor. The protractor is graduated to degrees. In wooden case, with full instructions for use,. . Each, $12 00

1874B. Section Liner and Scale Divider, like above, but protractor with vernier reading to five minutes, . . . Each, 13 00

This Section Liner is of simple, but substantial construction, of finest workmanship, absolutely accurate, and is easily and rapidly operated. With this instrument from 4 to 200 parallel lines per inch can be drawn, and when properly set, inch scales from ⅛ to 3 inches to the foot, decimal scales up tc 1000 per foot, etc., can be rapidly and accurately produced by it.

ODONTOGRAPH

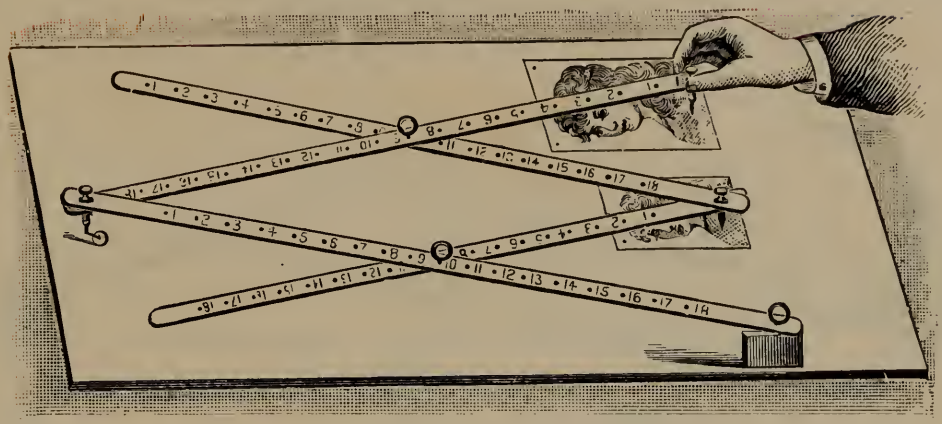


No. 1875.

No. 1875. Templet Odontograph, for describing Teeth of Gear Wheels. A useful instrument for mechanical drawing, with full description, in case, ... Each, $3 50

PANTOGRAPHS

For Enlarging and Reducing Drawings.



No. 1876.

No. 1875½. Pantograph of polished wooden bars, 41 in. long, fancy lined, with joints formed by bolts and thumb nuts, metal foot. For reducing and enlarging drawings in 34 ratios, from 8:1 to 1⅛:1 or vice versa. In plain wooden box, ... Each, $5 00

1876. Heavily mounted, with nickel-plated elbow joint wheel, pencil holder and exchangeable point; finely polished, black figures, in neat box, 21 inches long, ... Each, 2 50

1877. Brass mounted, with brass elbow joint wheel, pencil holder and movable point; polished, black figures, in box, . Each, 2 00

1878. Brass mounted, same as No. 1877, in every respect, except that it is not polished, in box, ... Each, 1 50

1879. Brass mounted, same as No. 1878, except movable point instead of wheel, ... Each, 1 00

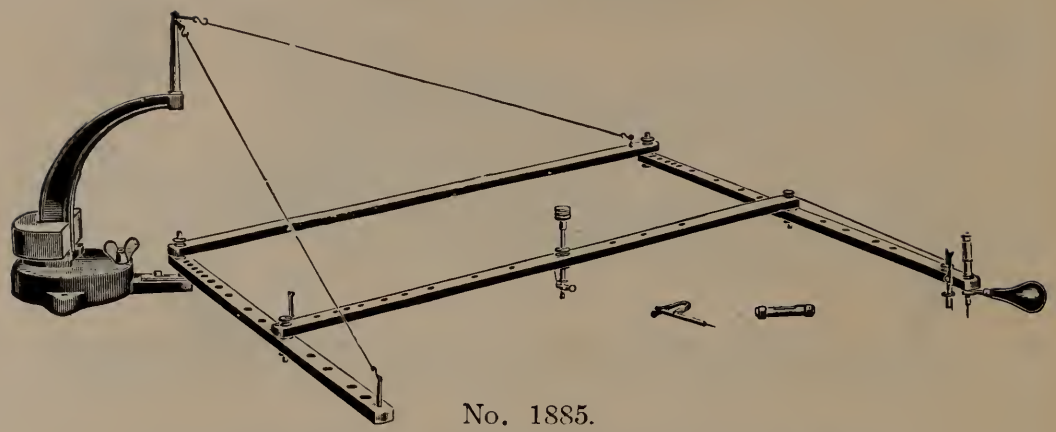
1880. The best Pantograph for the price. It has very neat and substantial trimmings, clean cut figures; a very neat and satisfactory instrument, ... Each, 50

1881. Is a smaller instrument. It is recommended by teachers as an excellent means of familiarizing children with form and proportion, and greatly assisting them in acquiring a knowledge of the rudiments of drawing by sight from original objects, ... Each, 25

Complete directions furnished with each Pantograph.

SUSPENDED PANTOGRAPHS

WITH WOODEN BARS



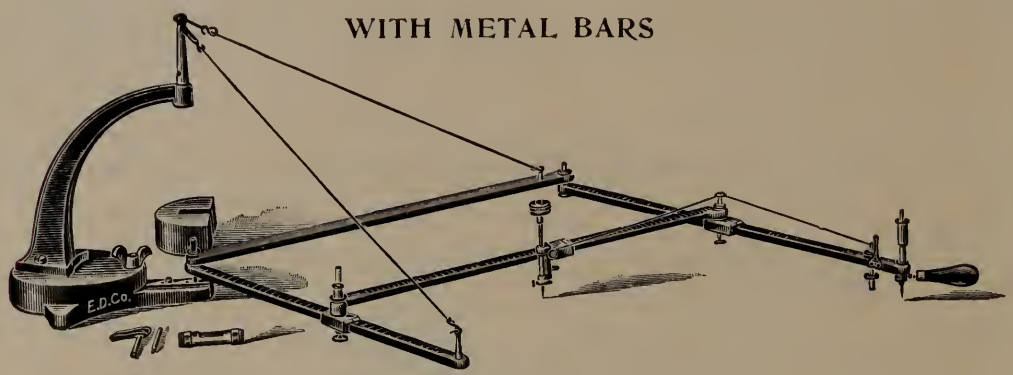
No. 1885.

For Reducing and Enlarging in the following ratios:
5:4, 4:3, 3:2, 5:3, 2:1, 5:2, 3:1, 4:1, 5:1, 6:1, 8:1, 10:1, 12:1, 20:1, or vice versa.

Suspended Pantograph, made of well seasoned Pearwood Bars, connected by polished steel cone joints with holes accurately drilled for the above ratios. Solid iron standard, with weight. Tracing and Pencil point are interchangeable. Instrument complete with adjustable tracing point, steel point, pencil point with 3 brass weights, spirit level and instructions for use. In wooden case with lock and key

No. 1885.	Suspended Pantograph with wooden bars 28 in. long, Each,	$35	00
1886.	" " " " " 33 " " "	36	00
1887.	" " " " " 38 " " "	37	50

WITH METAL BARS



No. 1889.

For Reducing from 20:1 to 5:4 or Enlarging from 1:20 to 4:5 in all ratios.

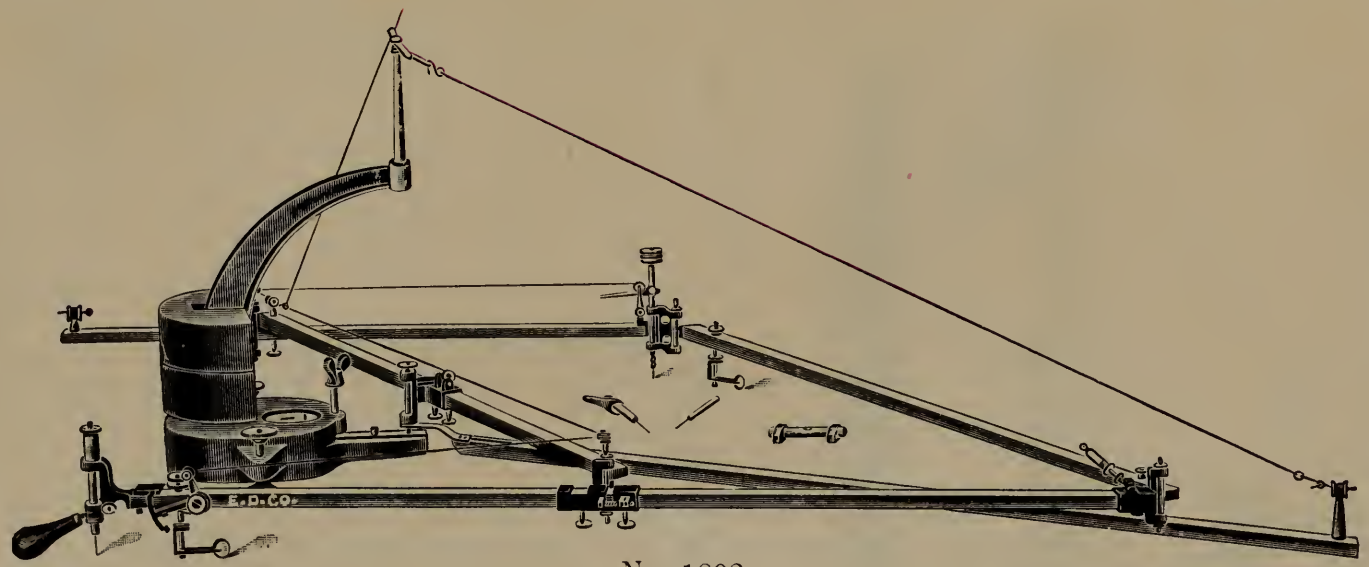
Suspended Pantograph, made of square hollow metal bars, fully divided and connected by cone joints, insuring an accurate and easy movement. The edges of the tubular slides are beveled to facilitate the reading of ratios. Solid iron standard with 1 extra weight. Tracing and pencil point are interchangeable. Instrument complete with adjustable tracing point, 2 steel points, pencil point with 3 brass weights, spirit level and instructions for use. In wooden case with lock and key.

No. 1889.	Suspended Pantograph with metal bars 28 in. long, Each,	$75	00
1890.	" " " " " 33 " " "	85	00
1891.	" " " " " 38 " " "	92	50

SUSPENDED PANTOGRAPHS

Continued

OF FINE MECHANICAL CONSTRUCTION, ESPECIALLY ADAPTED FOR VERY ACCURATE REPRODUCTIONS.



No. 1892.

For Reducing from 20:1 to 1:1 or Enlarging from 1:1 to 1:20 in all ratios, or reproducing the original size.

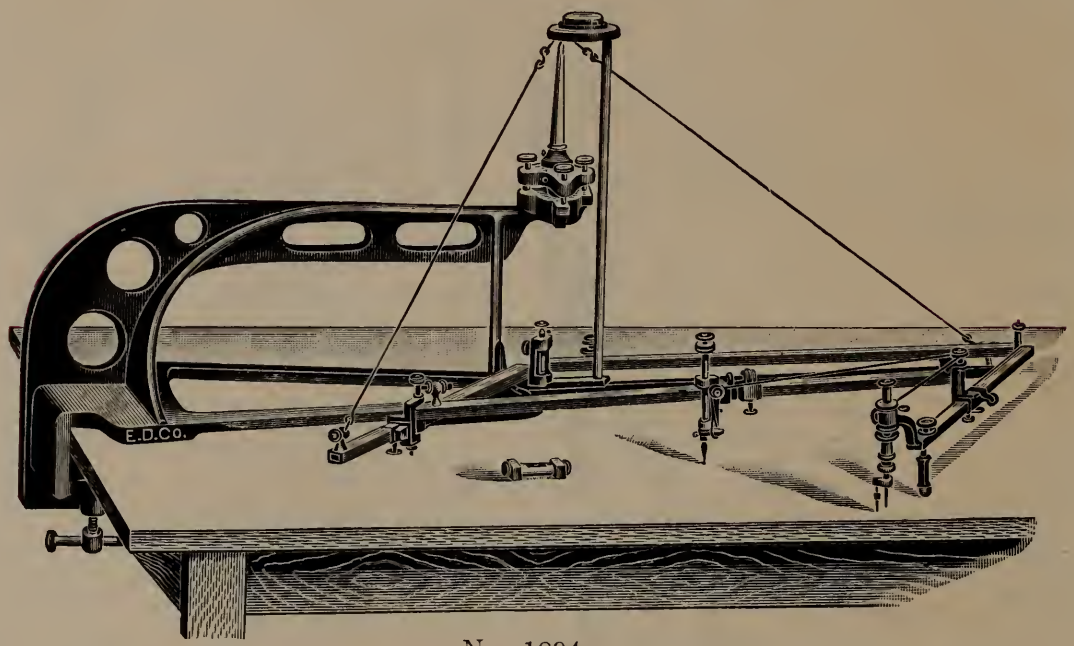
Suspended Precision Pantograph, made of square hollow metal bars, connected by pivot joints. The bars are fully divided, with verniers on the tubular slides and micrometer movement for adjusting the proportions. Supporting bar and appliances for interchanging the pole with the pencil point to reproduce the original size. Convenient controlling arrangement for operating the pencil from the tracing point. Solid iron standard, with 2 extra weights, 2 leveling screws, and 2 spirit levels to adjust the instrument to a horizontal position. Instrument complete with adjustable tracing point, 2 steel points, pencil point with 3 brass weights, spirit level and instructions for use.

In polished wooden case with lock and key.

No. 1892.	Suspended Precision Pantograph, with metal bars 33 inches long, ...	Each,	$160 00
1893.	" " " " " " 38 " "	"	170 00
1893½.	" " " like No. 1893, but with reading glass, . .	"	182 00

SUSPENDED PANTOGRAPHS *Continued*

OF FINE MECHANICAL CONSTRUCTION WITH ADJUSTABLE CLAMPING STANDARD, ESPECIALLY ADAPTED FOR VERY ACCURATE REPRODUCTIONS.



No. 1894.

For Reducing from 20:1 to 1:1 or Enlarging from 1:1 to 1:20 in all ratios, or reproducing the original size.

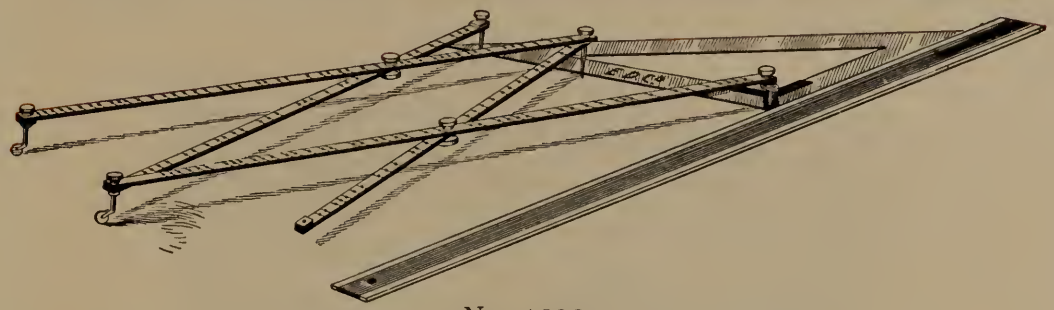
Suspended Precision Pantograph, made of square hollow metal bars, connected by pivot joints. The bars are fully divided, with verniers on the tubular slides and micrometer movement for adjusting the proportions. Supporting bar and appliances for interchanging the pole with the pencil point to reproduce the original size. Convenient controlling arrangement for operating the pencil from the tracing point.

The extra large adjustable clamping standard is of substantial iron construction, of perfect rigidity and firmness, held in position by a clamp screw. The instrument is clamped to the board or table, doing away with weights, and there are no leveling screws in the base to injure the board or drawing. The standard is made of one piece and does not obstruct any part of the drawing, as the base is raised off the board to permit drawings to be passed under it. The vertical support of the standard is readily adjusted by the four leveling screws and the adjustment controlled by means of a sensitive cross level. When the standard is leveled, the cross level with its support is removed and the Pantograph will hold its adjustment.

Instrument complete with adjustable tracing point, 2 steel points, pencil point with 3 brass weights, spirit level and instructions for use. In polished wooden case with lock and key. Standard in separate box.

No. 1894. Suspended Precision Pantograph, with metal bars 24 inches long. . . . . Each, $180 00

THE BOSTON UNIVERSAL PANTOGRAPH



No. 1898.

No. 1898. Boston Universal Pantograph, of German silver, with 18 in. Transparent Ambro Triangle, in box, with directions, Each, $45 00

The Boston Universal Pantograph has been designed in order to combine, at a reasonable cost, the accuracy of very expensive and intricate instruments with the simplicity and handiness of cheap ones.

The pivotal point is mounted on a celluloid triangle which may be placed anywhere on the most delicate drawing without injuring it, and a few weights will secure its position as well as will the commonly used screws or claws.

The center of the pivot is placed exactly over the right-angled corner of the triangle and can, therefore, easily be marked on the plan, making it possible—

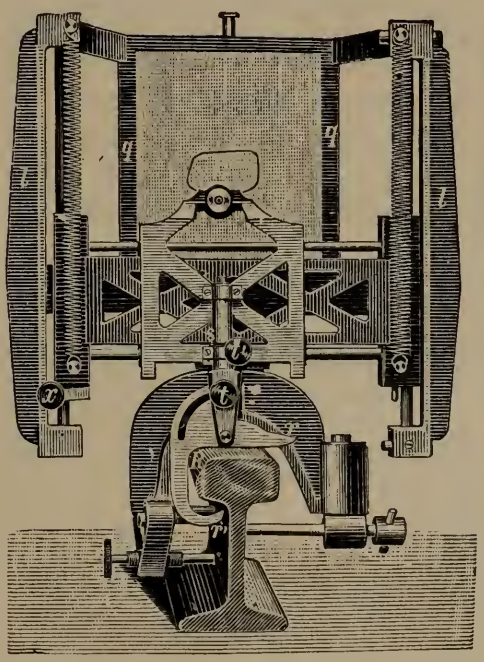
1st. To remove the Pantograph entirely and replace it as often as desired.

2d. To change the position of the triangle and still keep the same pivotal point, thus gaining access to that part of the drawing which the triangle may have covered at first, and obtaining a copy of the entire drawing within the sweep of the Pantograph (a circle 8 feet in diameter) without leaving any "bald spots" to be covered separately.

3d. To move the pivotal point from place to place on the plan in the systematic manner and thus reduce or enlarge plans of unlimited size and still get the copy in one piece.

In addition to its use for plain reducing and enlarging, the Boston Universal Pantograph covers a new field in being able to give a copy of a drawing distorted in a systematic manner, making the Pantograph adapted to a variety of purposes more readily imagined than enumerated.

RAIL PROFILE MACHINE

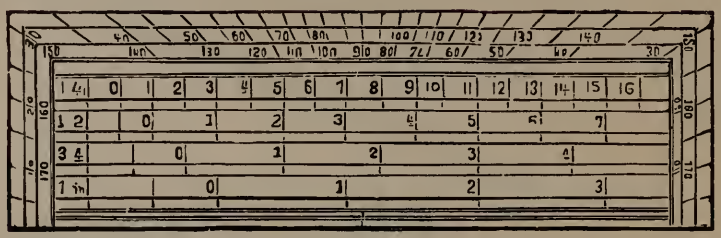


No. 1899.

No. 1899. Rail Profile Machine, producing a true and distinct outline of the head of the rail corresponding to its actual condition on the track, ... Each, $175 00

Full directions furnished with each instrument.

BOXWOOD AND IVORY PROTRACTORS



No. 1903.

No. 1903. Boxwood Protractors, 6 in. long, $1\frac{3}{4}$ in. wide, scales of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 in. to the foot. Scale of chords; diagonal scales, . . . Each, $0 35

1904. Square Ivory Protractor, 6 in. long, $1\frac{3}{4}$ in. wide, divided: whole degrees, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 in. scales, scale of chords, diagonal scale, scales of 25, 30, 35, 40, 45 parts per inch, ... Each, 1 60

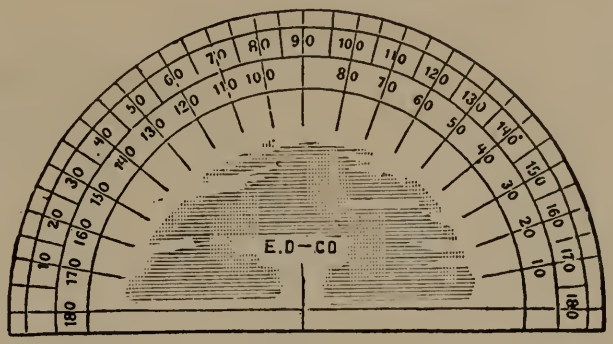
1905. Square Ivory Protractor, 6 in. long, $1\frac{3}{4}$ in. wide, divided: whole degrees, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 in. scales, scale of chords, diagonal scale, scales of 30, 35, 40, 45, 50, 60 parts per inch, . . Each, 2 00

1906. Square Ivory Protractor, 6 in. long, 2 in. wide, divided: whole degrees, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$ in. scales, scale of chords, diagonal scale, scales of 30, 35, 40, 45, 50, 60 parts per inch, Each, 4 35

PAPER PROTRACTORS

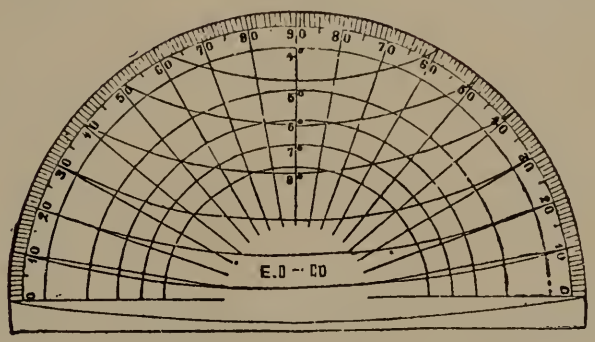
No. 1909.	Circular Protractor, on	Drawing Paper,	8 in. diam.,	$\frac{1}{2}°$,	.	Each,	$0	20
1910.	"	"	"	"	"	14 "	"	$\frac{1}{4}°$,	.	"		30
1911.	"	"	"	Bristol Board,		8 "	"	$\frac{1}{2}°$,	.	"		20
1912.	"	"	"	"	"	14 "	"	$\frac{1}{4}°$,	.	"		40
1913.	"	"	"	Tracing Paper,		8 "	"	$\frac{1}{2}°$,	.	"		20
1914.	"	"	"	"	"	14 "	"	$\frac{1}{4}°$,	.	"		30

HORN PROTRACTORS



No. 1921.

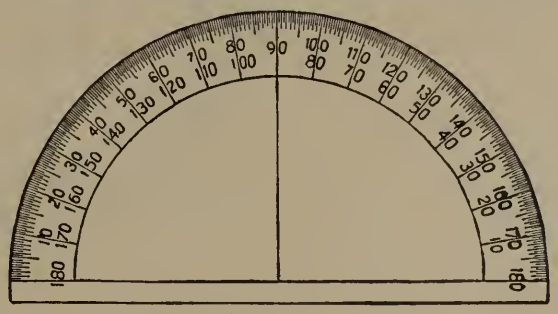
No. 1920.	Semicircular Horn Protractor,			$4\frac{1}{4}$	in.	diameter,	1°,	Each,	$0 16
1921.	"	"	"	$5\frac{1}{4}$	"	"	$\frac{1}{2}$°,	"	28
1922.	"	"	"	$6\frac{1}{4}$	"	"	$\frac{1}{2}$°,	"	33
1923.	"	"	"	7	"	"	$\frac{1}{2}$°,	"	45
1924.	"	"	"	8	"	"	$\frac{1}{2}$°,	"	65



No. 1926.

No. 1926. Railroad Curve Protractor, Horn, 8 in., $\frac{1}{2}$°, with circular curves, from $\frac{1}{2}$° to 8°, scale 400 feet to the inch, . . Each, $1 65

TRANSPARENT AMBRO PROTRACTORS

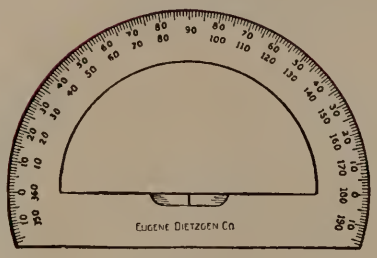


No. 1928.

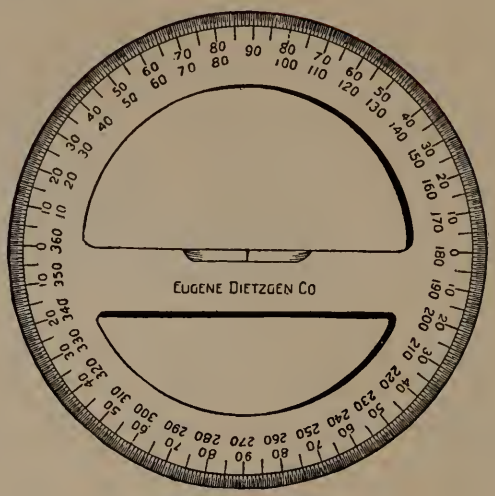
No. 1928A.	Semicircular Ambro Protractor,			5	in.	diameter,	$\frac{1}{2}$°,	Each,	$0 45
1928B.	"	"	"	6	"	"	$\frac{1}{2}$°,	"	60
1928C.	"	"	"	7	"	"	$\frac{1}{2}$°,	"	75
1928D.	"	"	"	8	"	"	$\frac{1}{2}$°,	"	1 20
1929A.	Circular	"	"	6	"	"	$\frac{1}{2}$°,	"	1 50
1929B.	"	"	"	8	"	"	$\frac{1}{2}$°,	"	2 25

TRANSPARENT AMBRO PROTRACTORS *Continued*

WITH BEVELED EDGES.



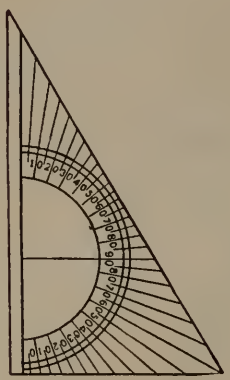
No. 1930A.



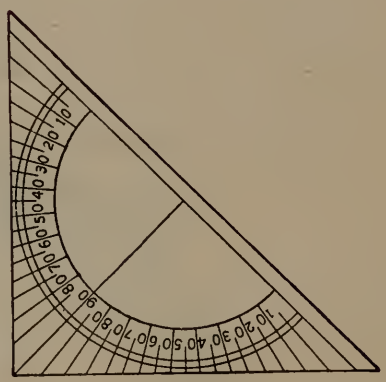
No. 1931 B.

			Each.
No. 1930A.	Semicircular Ambro Protractor,	6 in., beveled edge, ½°,	$2 75
1930B.	" " "	8 " " " ½°,	3 50
1931A.	Circular " "	6 " " " ½°,	3 50
1931B.	" " "	8 " " " ½°,	4 50
1931C.	" " "	10 " " " ½°,	5 50

TRIANGLE AMBRO PROTRACTORS



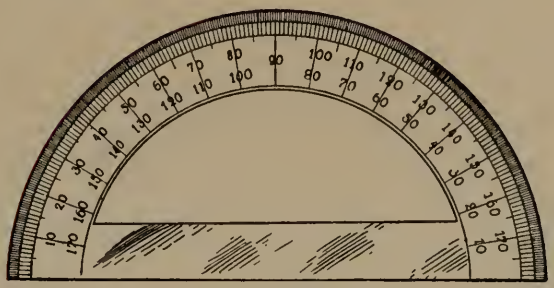
No. 1933–5.



1934–5.

			Each.
No. 1933–5.	Triangle Ambro Protractor,	30°×60°, 5 in., div. to 1°,	$0 45
1933–6.	" " "	30°×60°, 6 " " 1°,	50
1933–7.	" " "	30°×60°, 7 " " 1°,	70
1934–5.	" " "	45°, 5 " " 1°,	50
1934–6.	" " "	45°, 6 " " 1°,	70
1934–7.	" " "	45°, 7 " " 1°,	90

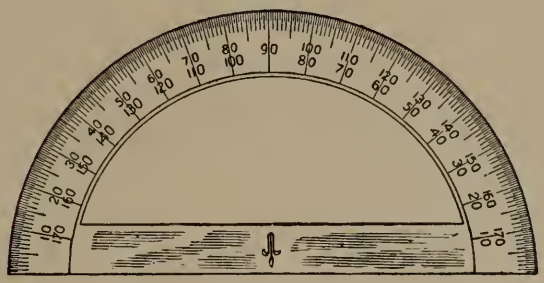
BRASS PROTRACTORS



No. 1936.

No. 1935.	Semicircular, nickel plated,		$3\frac{1}{2}$ in. diameter,		1°, . .	Each,	$0 08
1935½.	"	Brass,	$3\frac{1}{2}$ "	"	1°, . .	"	12
1936.	"	"	$4\frac{1}{4}$ "	"	1°, .	"	25
1937.	"	"	$5\frac{1}{8}$ "	"	½°, . .	"	50
1938.	"	"	$6\frac{3}{8}$ "	"	½°, . .	"	75

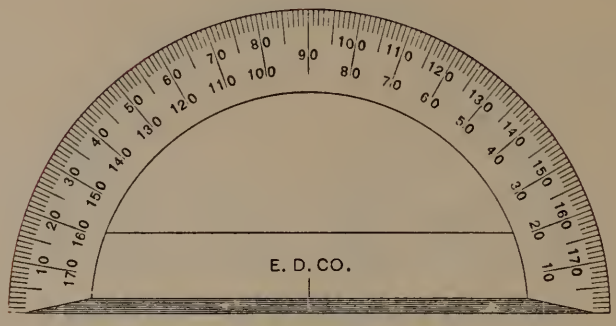
GERMAN SILVER PROTRACTORS



No. 1941.

No. 1940.	Semicircular, German Silver,		$4\frac{1}{4}$ in. diameter,		1°, . .	Each,	$0 50
1941.	"	"	" $5\frac{1}{8}$ "	"	½°, . .	"	75
1941½.	"	"	" 6 "	"	½°, . .	"	80
1942.	"	"	" $6\frac{3}{8}$ "	"	½°, . .	"	90
1943.	"	"	" $7\frac{1}{2}$ "	"	½°, . .	"	1 20
1944.	"	"	" $8\frac{1}{2}$ "	"	½°, . .	"	1 50

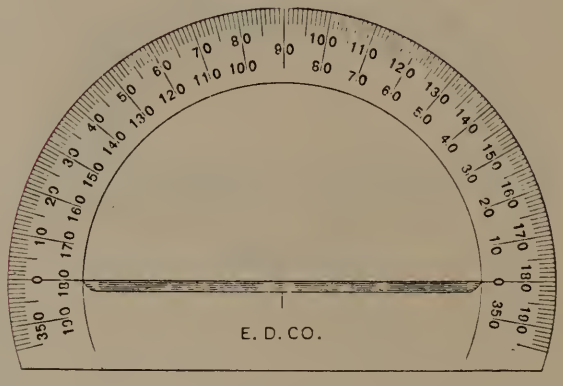
GEM UNION PROTRACTORS



No. 1950.

Center on Outer Edge.

No. 1950.	Semicircular,	German Silver,	4 in.,	beveled edge,	1°,	.	Each,	$1	20
1951.	"	"	5 "	"	"	½°,	. "	1	50
1952.	"	"	6 "	"	"	½°,	. "	2	00
1953.	"	"	6 "	"	"	¼°,	. "	2	40
1954.	"	"	7 "	"	"	½°,	. "	2	70
1955.	"	"	8 "	"	"	½°,	. "	3	50

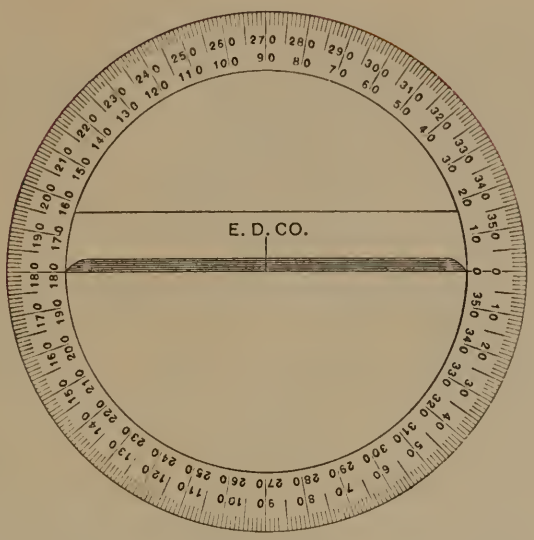


No. 1960.

Center on Inner Edge.

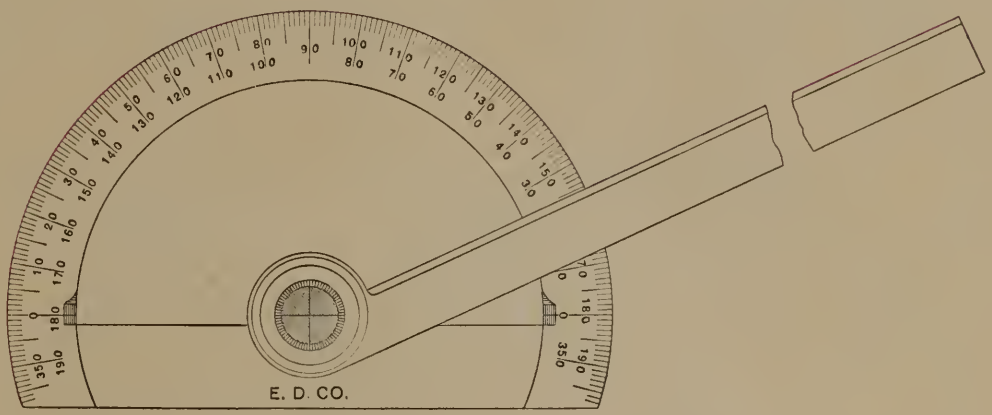
No. 1960.	Semicircular,	German Silver,	4 in.,	beveled edge,	1°,		Each,	$1	50
1961.	"	"	5 "	"	"	½°,	"	2	00
1962.	"	"	6 "	"	"	½°,	"	2	40
1963.	"	"	6 "	"	"	¼°,	"	3	00

GEM UNION PROTRACTORS *Continued*



No. 1965.

No. 1965. Circular, German Silver, 5 in., ½ degree, beveled edge, . Each, $5 50



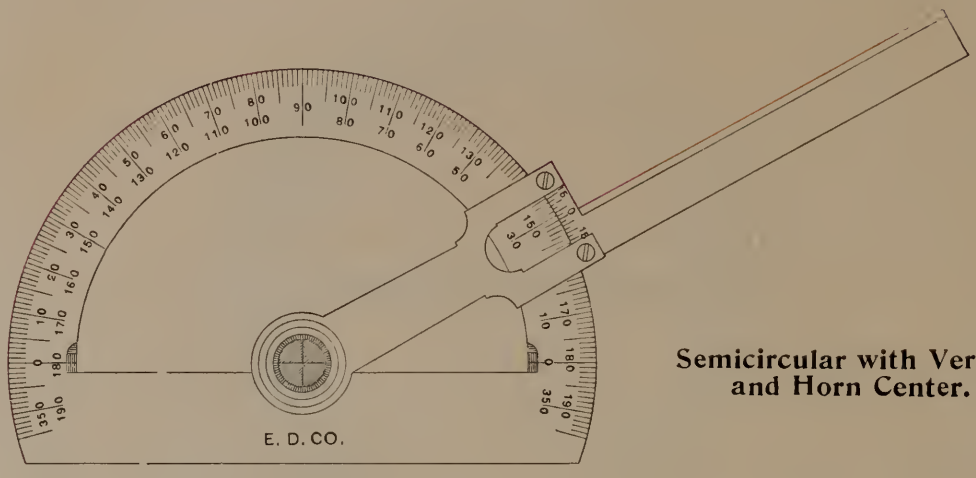
No. 1970.

Semicircular with Movable Arm and Horn Center.

No. 1970. Semicircular, German Silver, 6 in., ½ degree, length of arm beyond outer edge, 6 in., ... Each, $7 50

1971. Semicircular, German Silver, 7 in., ½ degree, length of arm beyond outer edge, 6½ in., ... " 9 00

GEM UNION PROTRACTORS *Continued*



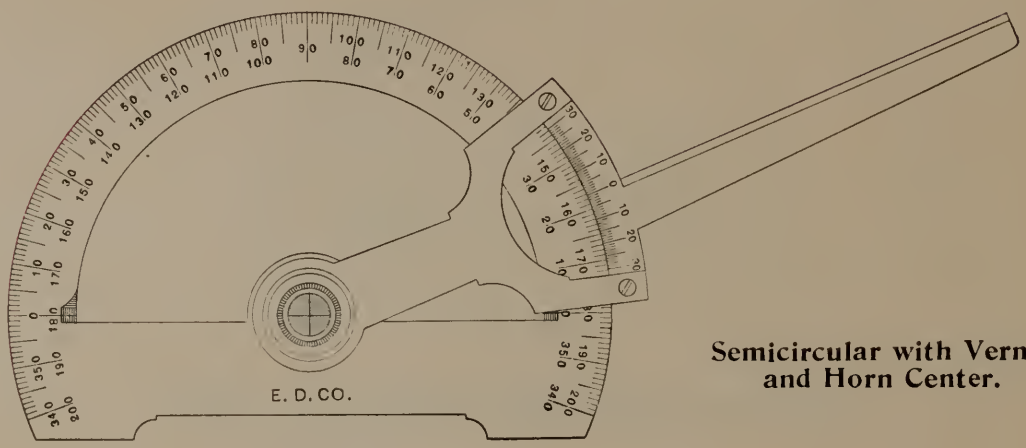
Semicircular with Vernier and Horn Center.

No. 1975.

No. 1975.	German Silver,	5½	in.,	½	deg.,	Vernier reading to	3	min.,	Each,	$11	00
1976.	"	"	8	"	¼	"	"	"	1	"	"	14	50
1977.	"	"	10	"	¼	"	"	"	1	"	"	18	00

Length of arm beyond outer edge of Protractors, ... Nos. 1975, 5½ in.; 1976, 6 in.; 1977, 6½ in.

Morocco leather case, silk velvet lined, Each, ... $3 50 $4 00 $4 50



Semicircular with Vernier and Horn Center.

No. 1978.

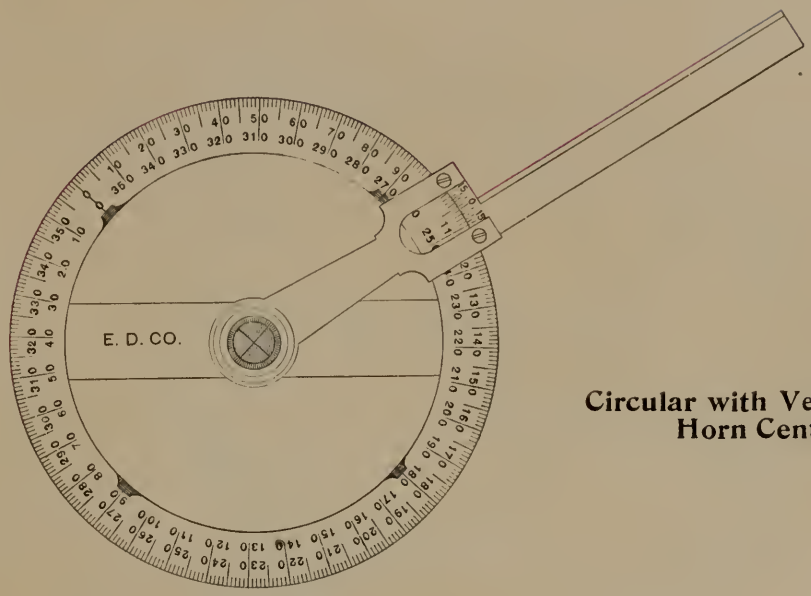
No. 1978.	German Silver,	8	in.,	½	deg.,	Vernier reading to	1	min.,	Each,	$16	00
1979.	"	"	10	"	½	"	"	"	1	"	"	19	25

Length of arm beyond outer edge of Protractors, Nos. 1978, 6 in.; 1979, 6½ in.

Morocco leather case, silk velvet lined, . . Each, $4 00 $4 50

GEM UNION PROTRACTORS

Continued



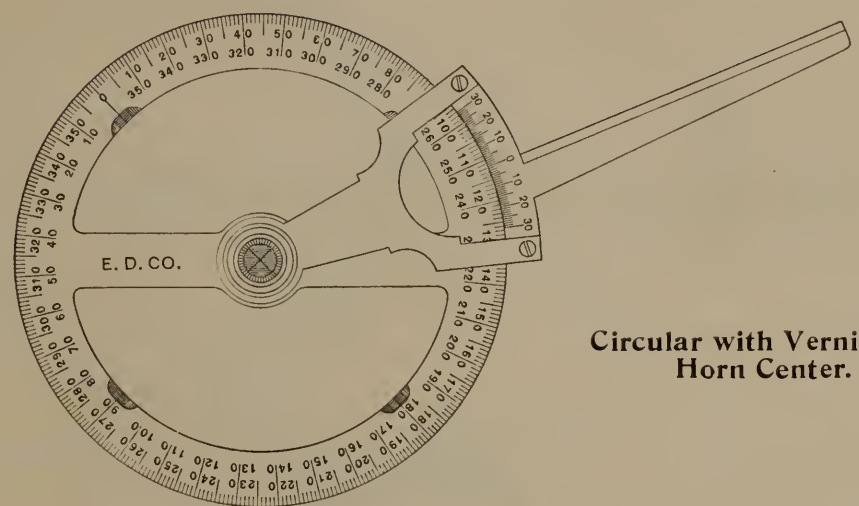
Circular with Vernier and Horn Center.

No. 1980.

No. 1980.	German Silver,	5½	in.,	½	deg.,	Vernier reading to	3	min.,	Each,	$14	50
1981.	"	"	8	"	¼	"	"	"	1	"	"	17	00
1982.	"	"	10	"	¼	"	"	"	1	"	"	21	00

Length of arm beyond outer edge of Protractors, ... Nos. 1980, 5½ in.; 1981, 6 in.; 1982, 6½ in.

Morocco leather case, silk velvet lined, Each, ... $4 00 $4 50 $5 00



Circular with Vernier and Horn Center.

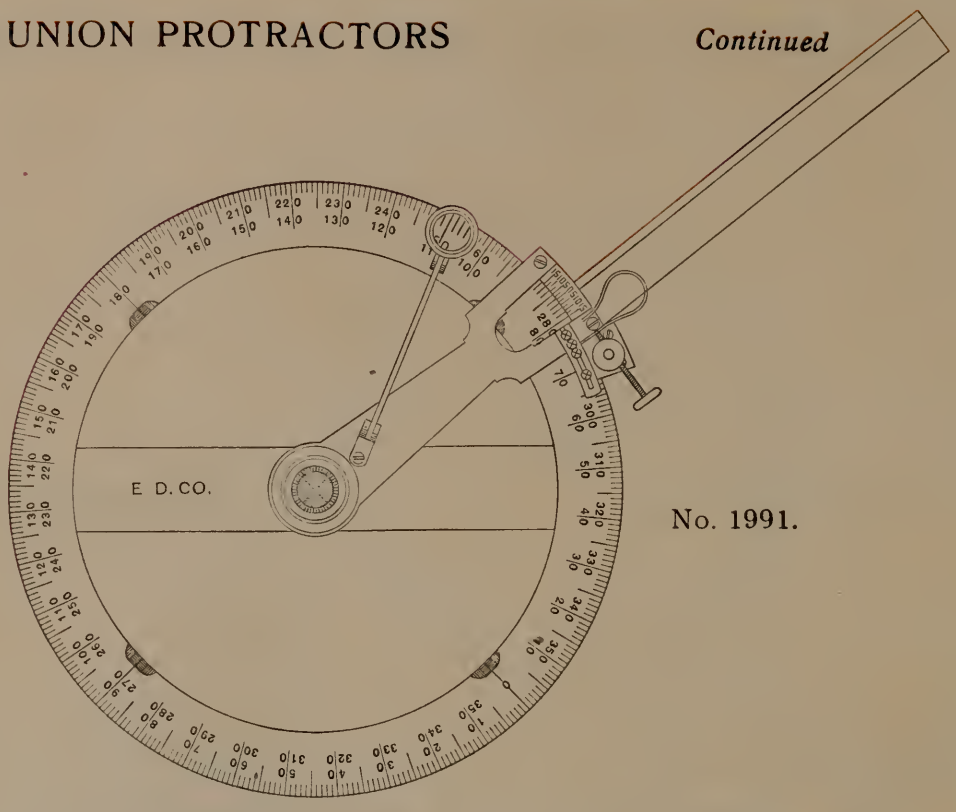
No. 1985.

No. 1985.	German Silver,	8	in.,	½	deg.,	Vernier reading to	1	min.,	Each,	$18	50
1986.	"	"	10	"	½	"	"	"	1	"	"	22	50

Length of arm beyond outer edge of Protractors, Nos. 1985, 6 in.; 1986, 6½ in.

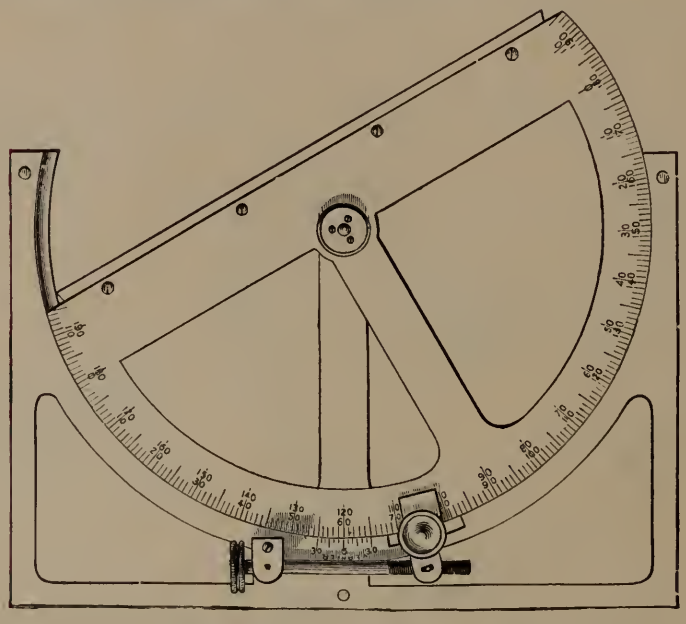
Morocco leather case, silk velvet lined, . . Each, $4 50 $5 00

GEM UNION PROTRACTORS *Continued*



No. 1991.

No. 1991. Circular, German Silver, 8 in., ¼ degree, Vernier reading to 1 minute, with clamp screw, micrometer adjusting screw to vernier and magnifying lens, ... Each, $23 50
Morocco leather case, silk velvet lined, ... " 5 00

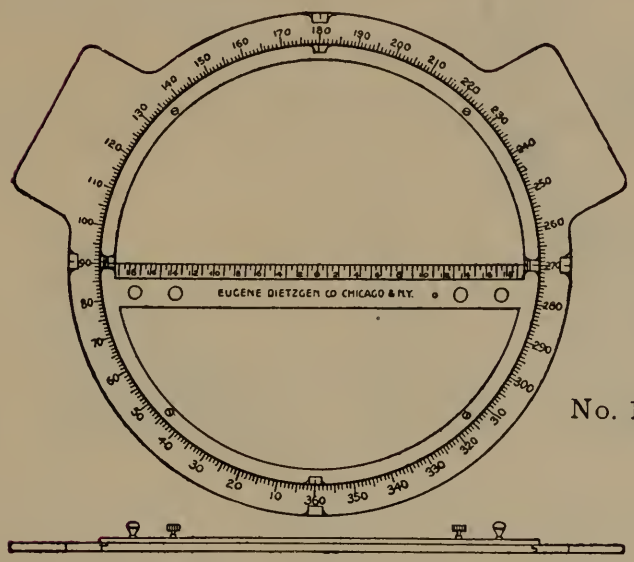


No. 1993.

No. 1993. Crozet Protractor, German Silver, 8 in., graduated to ½ degree; folded vernier reading to minutes, with clamp and tangent screws, in polished wooden case, . . Each, $40 00

COLBY'S PROTRACTOR

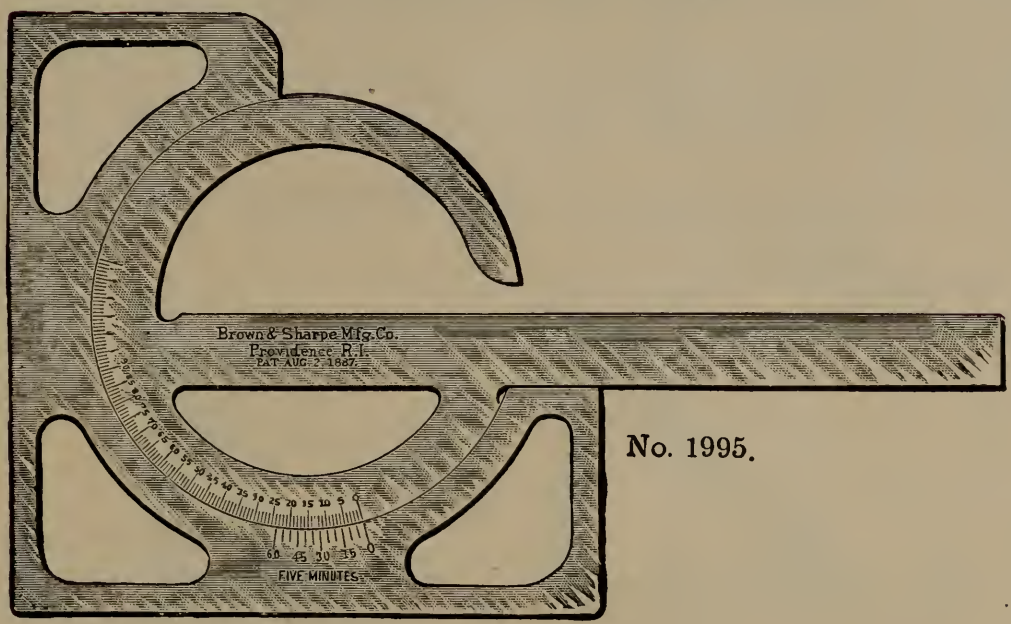
Patented Oct. 3, 1893.



No. 1994.

No. 1994. Colby's Protractor, German Silver, Limb 12 in., divided to 15 minutes, Scale graduated as required, in case, Each, **$60 00**

DRAFTSMAN'S PROTRACTOR



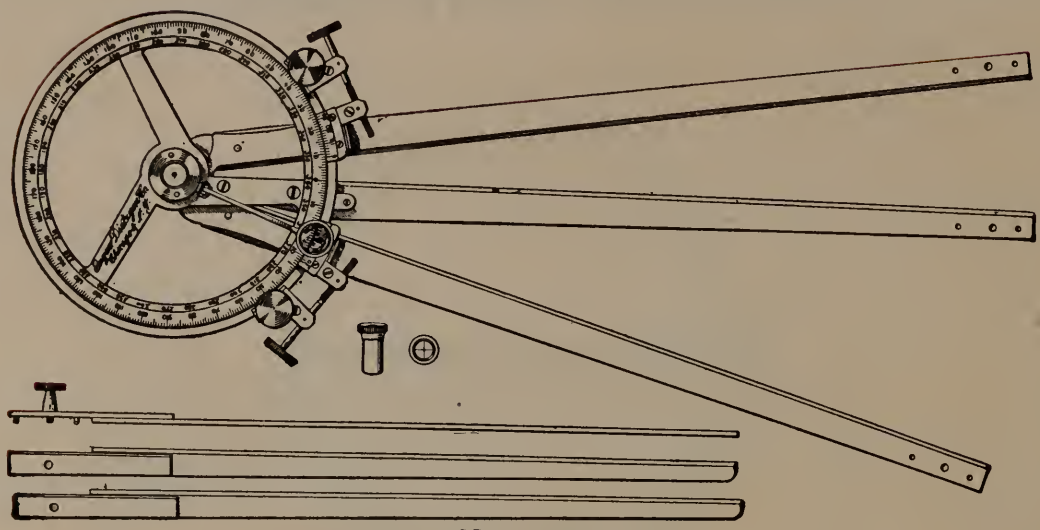
No. 1995.

No. 1995. Draftsman's Steel Protractor, with directions, . . Each, $6 50
1995½. " " " in morocco case, . . " 7 75

This Protractor is made from sheet steel and has a blade 8½ inches long. The graduations read to degrees and the vernier reads to five minutes.

There are no projections on either face of the Protractor; and consequently it can be used on either edge of the blade or either side up. This makes it particularly convenient in dividing circles, transferring angles, drawing oblique lines at right angles to each other, or laying off given angles each side of a vertical or horizontal line without changing the setting.

THREE ARM PROTRACTOR



No. 1996.

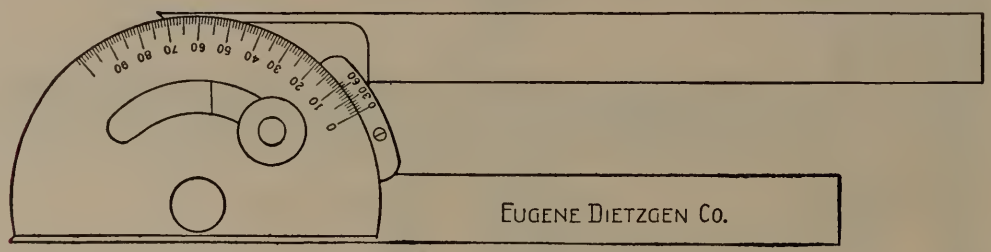
No. 1996. Three Arm Protractor or Station Pointer, in hardwood case, with screwdriver and accessories, ... Each, $87 50

As made by us for the U. S. Navy. The circle is 6¼ inch diameter, made of bronze, graduated on solid silver, and numbered by two rows of figures reading in opposite directions, from 0 to 360.

The arms are 18 inches long, made of German silver, and have extensions of 13½ inches; the two movable arms are provided with clamp and tangent screws and verniers reading to single minutes.

The magnifier is pivoted and hinged to the center of the circle, and moves parallel to the graduation. The instrument is also provided with three interchangeable cylindrical centers, one with glass bottom, one with horn bottom having a small hole for pencil point, and one with spring needle point for locating the exact position.

DRAFTSMAN'S STEEL PROTRACTOR



No. 1997A.

No. 1997A. Draftsman's Steel Protractor, ... Each, $4 00
1997B. " " " in Mahogany case, . " 5 00

This Protractor has spring-tempered blades about 9 inches long. The arc is four inches in diameter, graduated to degrees, with a vernier reading to five minutes. It has a clamping screw that securely holds the blades at any angle and also serves as a knob.

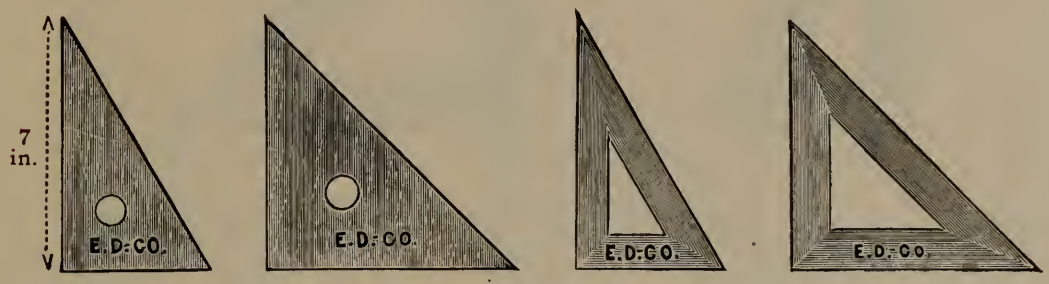
Either blade can be used in contact with a **T** square, giving any angle and its complement from 0° to 90°.

It forms a perfect adjustable triangle, and is nicely finished. It is a convenient and reliable tool.

WOODEN TRIANGLES

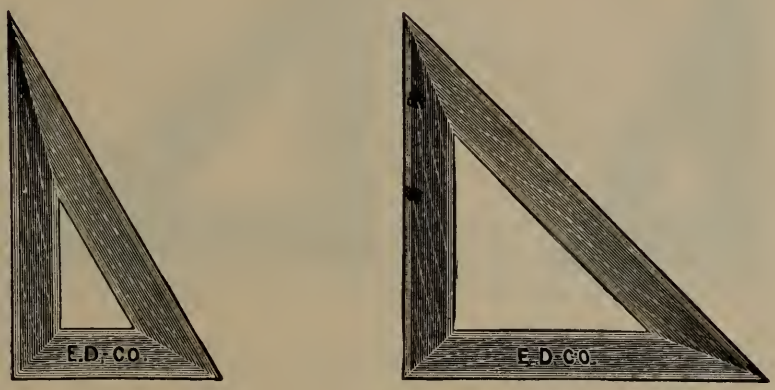
These Triangles are made of thoroughly seasoned material. The workmanship is of the best, and with our improved machinery, perfect accuracy is assured.

The size of all Triangles is determined by the length of the catheti indicated by the dotted lines. In order to secure a 30°×60° and a 45° degree Triangle of even size of hypothenuse, order the 45° Triangle about 2 inches shorter than the 30°×60° Triangle.



No. 2000. 2001. **2006.** 2007.

No. 2000.	Cherry Triangles, solid, 30°×60°, . . .	Size,	7			9	in.
		Each,	$0 08			10	
2001.	Cherry Triangles, solid, 45°, ...	Size,	5¾			7⅜	in.
		Each,	$0 08			10	
2002.	Cherry Triangles, framed, mortised joints, 30°×60°,	Size,	8	10	12	14	in.
		Each,	$0 12	16	20	24	
2003.	Cherry Triangles, framed, mortised joints, 45°, .	Size,	6	8	10	12	in.
		Each,	$0 12	16	20	24	
2006.	Pearwood Triangles, framed, extra quality, 30°×60°,	Size,	8	10	12	14	in.
		Each,	$0 18	24	30	36	
2007.	Pearwood Triangles, framed, extra quality, 45°, . .	Size,	6	8	10	12	in.
		Each,	$0 18	24	30	36	



No. 2010. 2011.

No. 2010.	Hardwood lined Triangles, mortised joints, 30°×60°,	Size,	8	10	12	14	17 in.
		Each,	$0 25	30	40	50	75
2011.	Hardwood lined Triangles, mortised joints, 45°, .	Size,	6	8	10	12	14 in.
		Each,	$0 25	30	40	50	75

WOODEN TRIANGLES *Continued*

No. 2012.

2013.

No. 2012. Mahogany, Ebony Lined Triangles, mortised joints, 30°×60°,

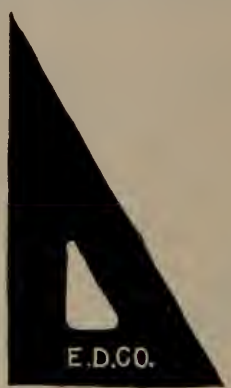
Size,	8	10	12	14	17	20 in.
Each,	$0 35	40	55	75	1 20	1 50

2013. Mahogany, Ebony Lined Triangles, mortised joints, 45°,

Size,	6	8	10	12	14	17 in.
Each,	$0 35	40	55	75	1 20	1 50

BLACK AMBRO TRIANGLES

Our tools of "Black Ambro" are far superior to Hard Rubber, as they do not assimilate dust nor smudge the drawing paper, and, unlike Hard Rubber, are not liable to break when dropped.



No. 2018.

2020.

No. 2018. Black Ambro Triangles, 30°×60°,

Size,	4	5	6	7	8	9	10	12	14	16	18 in.
Each,	$0 15	20	25	30	35	40	45	60	1 00	1 50	2 00

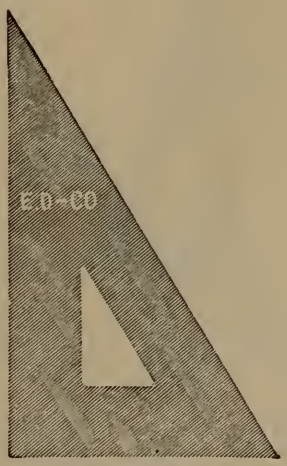
2020. Black Ambro Triangles, 45°,

Size,	3	4	5	6	7	8	9	10	12	14	16 in.
Each,	$0 15	25	30	35	40	45	55	60	1 00	1 50	2 20

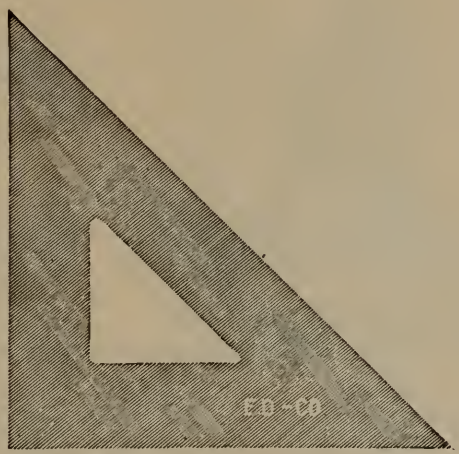
TRANSPARENT AMBRO TRIANGLES

All our tools of **"Transparent Ambro"** are made of the finest material obtainable and have the following high qualities, viz.: they are allowing of more rapid and accurate work, owing to their transparency; they do not assimilate dust; they keep their edges almost like metal tools. We claim some credit for having first put them on the market.

REGULAR STYLE.



No. 2021.



2022.

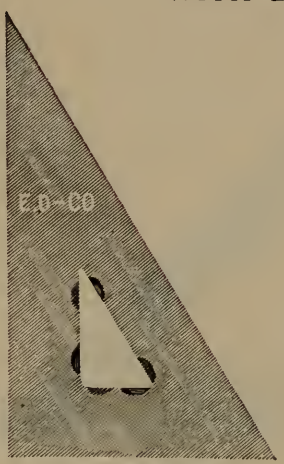
No. 2021. Transparent Ambro Triangles, 30°×60°,

Size,	4	5	6	7	8	9	10	11	12	14	16	18 in.
Each,	$0 20	30	35	40	50	60	70	80	95	1 55	2 35	3 20

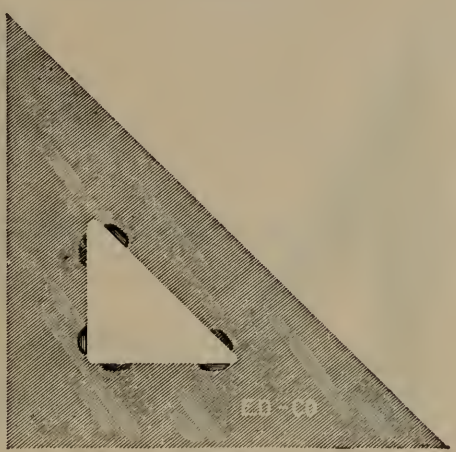
2022. Transparent Ambro Triangles, 45°,

Size,	3	4	5	6	7	8	9	10	12	14	16 in.
Each,	$0 25	30	40	50	60	70	90	1 05	1 55	2 10	3 00

WITH BEVELS ON INNER EDGES.



No. 2021B.



2022B.

No. 2021B. Transparent Ambro Triangles, 30°×60°, beveled on inner edges.

Size,	4	5	6	7	8	9	10	11	12	14	16	18 in.
Each,	$0 25	35	40	45	55	65	75	85	1 00	1 65	2 50	3 30

2022B. Transparent Ambro Triangles, 45°, beveled on inner edges.

Size,	3	4	5	6	7	8	9	10	12	14	16 in.
Each,	$0 30	35	45	55	65	75	95	1 10	1 65	2 20	3 15

Nos. 2021B and 2022B have bevels on their inner edges from opposite surfaces. By catching finger nail under the bevel when taking hold, they can be picked up more readily than the regular style, and at the same time lessen the liability of blurring fresh ink lines.

TRANSPARENT AMBRO TRIANGLES *Continued*

No. 2023.

2023B.

No. 2023. Transparent Ambro Triangles, 22½°×67½°, regular.

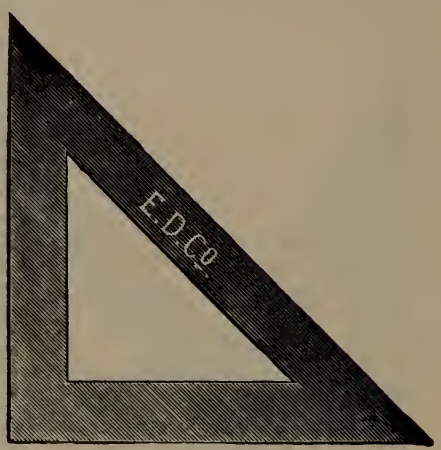
Size,	4	6	8	10	12	14	16 in.
Each,	$0 20	35	50	70	95	1 55	2 35

2023B. Transparent Ambro Triangles, 22½°×67½°, beveled on inner edges.

Size,	4	6	8	10	12	14	16 in.
Each,	$0 25	40	55	75	1 00	1 65	2 50

STEEL TRIANGLES

No. 2024.



2025.

No. 2024. Steel Triangles, nickel plated, 30°×60°.

Size,	6	7	8	10½	15 in.
Each,	$3 20	3 50	3 85	4 25	6 50

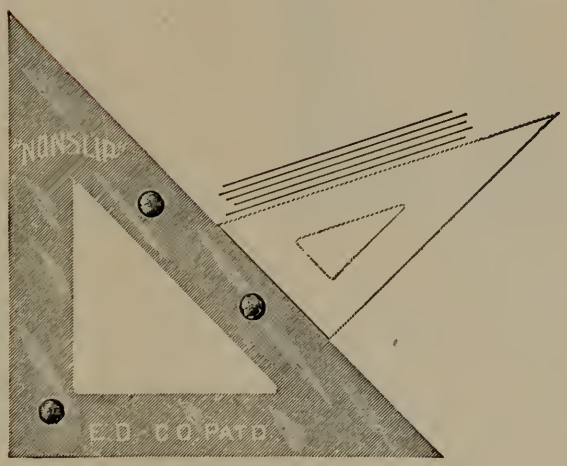
No. 2025. Steel Triangles, nickel plated, 45°.

Size,	5	6½	8	10	12 in.
Each,	$3 20	3 50	4 25	5 50	6 50

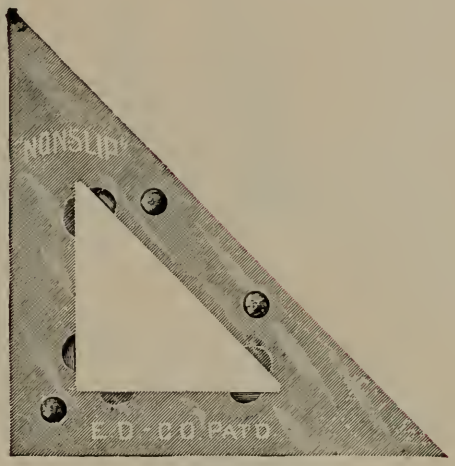
TRANSPARENT AMBRO TRIANGLES *Continued*

THE "NON-SLIP" TRIANGLE

Patented



No. 2022N.



2022P.

Most all draftsmen in the manipulation of two triangles have experienced an irritating sense of inability to always keep the triangle under the left hand from slipping, while the triangle under the right hand was being shifted or reversed, or held for drawing the desired lines. This is particularly true when working on tracing cloth, or hard surface drawing paper.

The triangle here illustrated eliminates this tendency to slip and with use will relieve the muscular tension in the arm and hand that is often exerted and maintained when it is desired to avoid losing time.

The "Non-Slip" Triangle is made of transparent ambro, and is provided with three soft rubber discs, set through holes in the triangle, so as to have friction contact with the drawing, and yet allow the triangle to lay close to the surface when held with a light pressure of the hand. Its use will be of particular advantage for section lining or shading in all instances where the use of a T Square and triangle, or a parallel ruler, is not practicable.

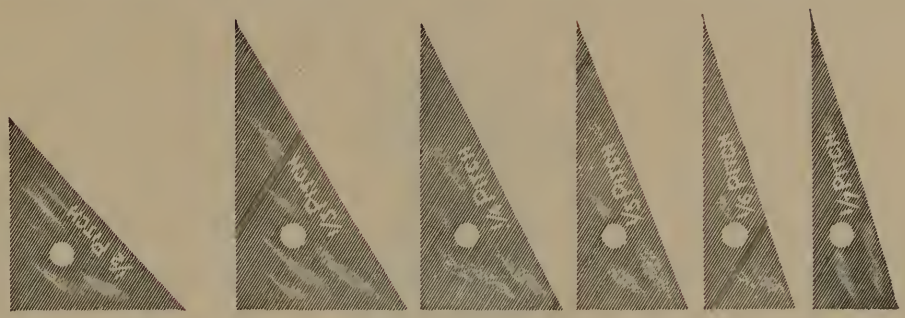
We do not recommend this device for use in all triangles or in small sizes. It is only the stationary triangle that needs the attachment, and one 45° eight inches or over in size, in a set of three or four, will be sufficient.

Cross Section showing normal shape of rubber disc.

Cross Section showing shape of rubber disc when triangle is in use.

No. 2022N.	"Non-Slip" Transparent Ambro Triangles, 45°, regular style.				
	Size,	8	10	12	14 in.
	Each,	$1 00	1 35	1 85	2 40
2022P.	"Non-Slip" Transparent Ambro Triangles, 45°, beveled on inner edges.				
	Size,	8	10	12	14 in.
	Each,	$1 05	1 40	1 95	2 50
2022R.	Extra Rubber Discs,			Per set of 3.	$0 25

TRIANGLES FOR ROOF PITCHES AND EMBANKMENTS



No. 2026.

No. 2026. Transparent Ambro Triangles for Roof Pitches, 6 in set,
Per set, ... $2 80; Each, $0 55

No. 2026½.

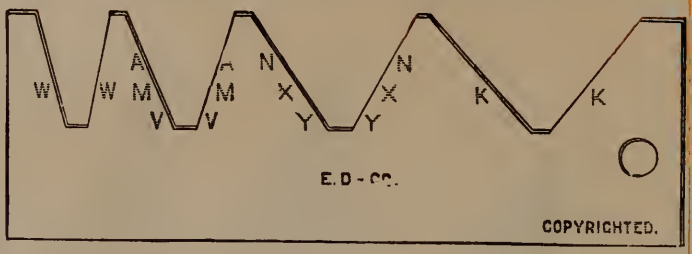
No. 2026½. Transparent Ambro Triangles for Embankments, 8 slopes
on 6 Templets, Per set, ... $4 25; Each, $0 80

LETTERING TRIANGLES

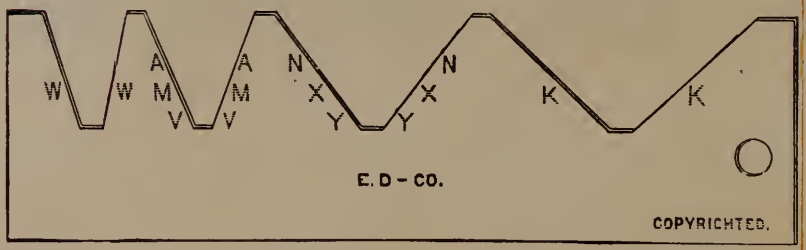
No. 2028½.

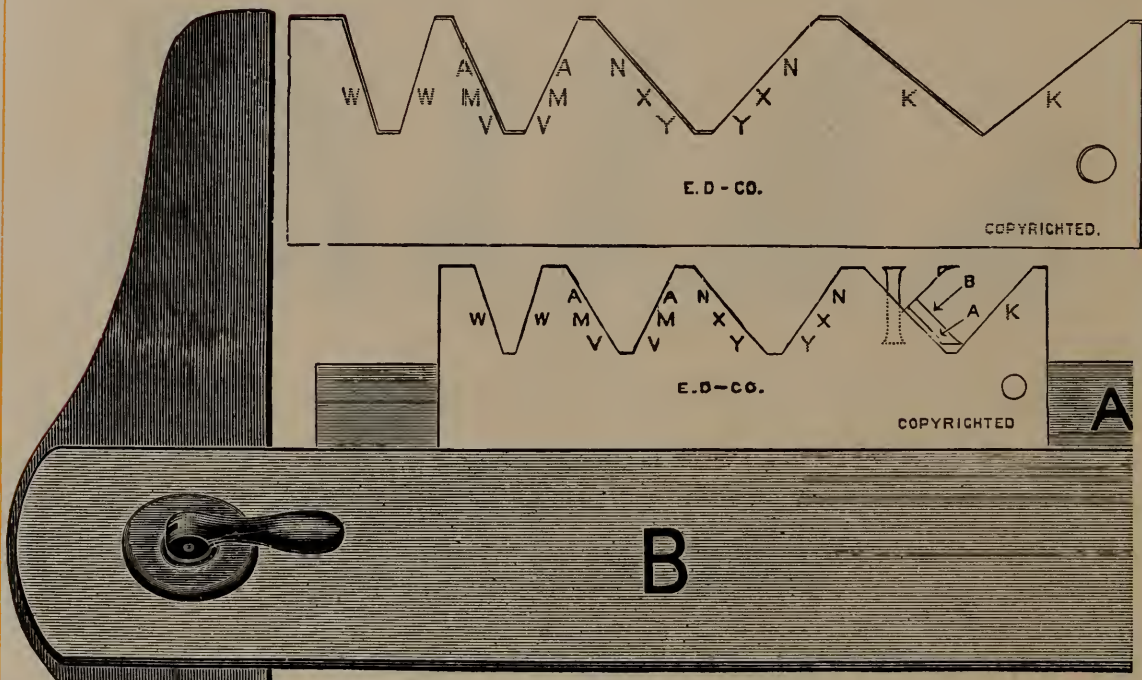
No. 2028. Lettering Triangles of Black Ambro, 3½ in., Per set of 3, $1 20
2028½. " " " Trans. " 3½ " " " 3, 1 50

E. D. CO.'S STYLE OF LETTERING ANGLES



Illustrations ½ size.





No. 2029. E. D. Co.'s Style of Lettering Angles, made of "Transparent Ambro."

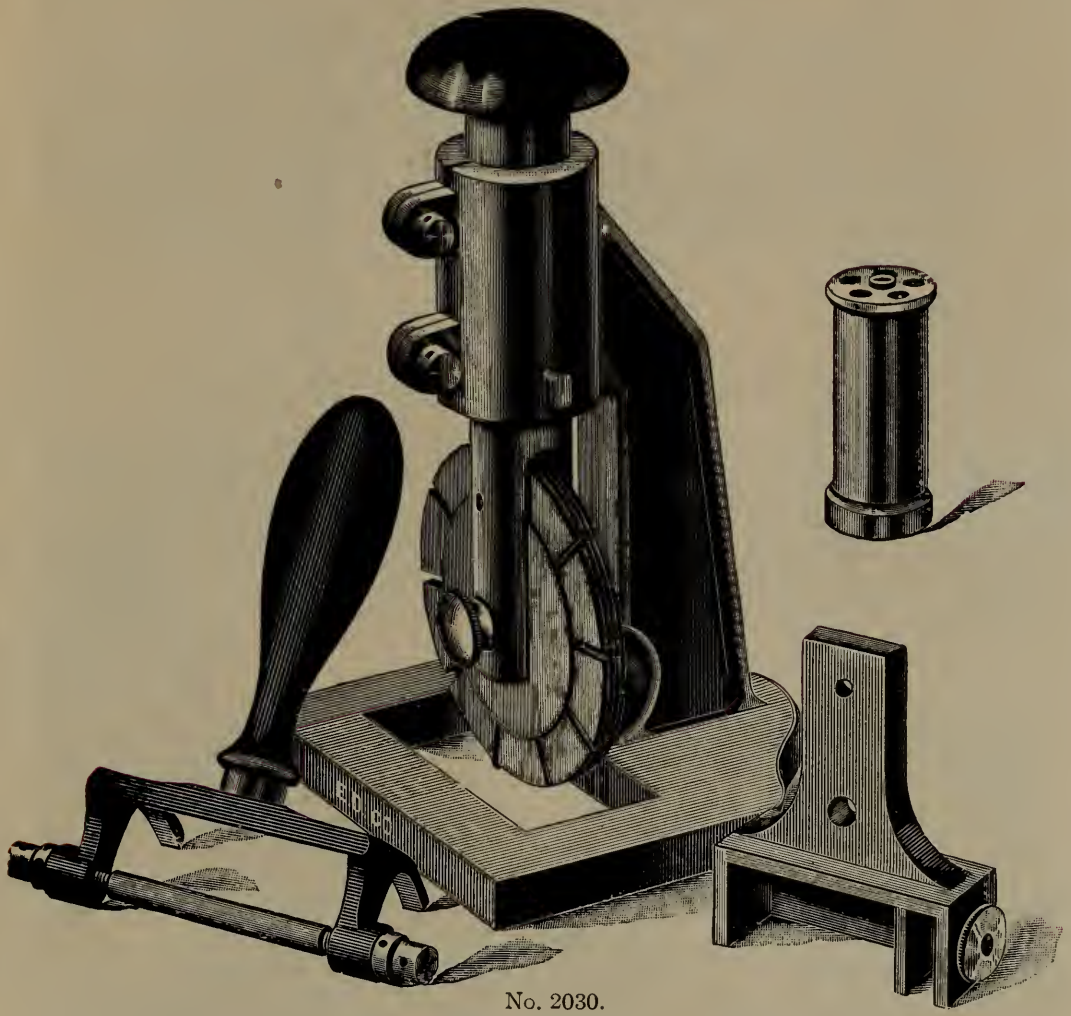
Per set of above 3 pieces, ... Each, $1 80

Our New Style Lettering Angles facilitate rapid and accurate lettering because all slopes are in one horizontal line and in equal distance from the T Square or Straight Edge along which they slide. The old style required constant moving up and down to accomplish the desired slope. Our new style has the further advantage that it permits of inking the letters without risk of blurring the lines. Put a piece of cardboard or blotting paper "A" next to edge of T Square "B" and under the lettering angle, thus raising the lettering angle over the drawing paper. In this way you could ink slope "A" of the letter "K," and while that line is still wet slide along the angle to draw slope "B," as shown by above cut.

LETTERING DEVICE

Specially Invaluable to U. S. and City Engineers for Fine Map Work.

Illustration ½ size.



No. 2030.

This instrument, as it is illustrated above, is designed to increase at least tenfold the accuracy and rapidity with which pen-work in all kinds of lettering on maps, plans and drawings may be accomplished. The work can be done at an astonishingly small cost, and in quality it will be found satisfactory to the most fastidious.

This device solves the problem how to repeat a word or combination of figures upon a map or drawing as often as may be required. It has met the approbation of all who had occasion to use or see it. The applications are almost unlimited, as will readily be seen

The construction is very simple; the base and upright are of one casting, to which is accurately fitted a vertical slide that receives the type-box or dials, as the case may be. These attachments are fastened by means of a milled head screw, as shown in cut. The slide is provided with a slot and key to insure a perfect vertical motion without any lateral play. The front edge of base is made exactly parallel with the dials and type-box, so that the regular T square or straight edge may be used to slide the instrument along where a number of figures are to be printed in a straight line.

The type-box, 2⅛ inches long and ⅝ inches wide, is intended to receive the word or combination of characters which are to be used in a given class of work. The type is fastened in the ordinary manner by means of a clamp-screw. Into the dials are to be inserted the figures, about ⅛ inch high and smaller, from 0 to 9, and there being four of these dials, it will be seen that any combination of figures containing four numbers may be printed at one time.

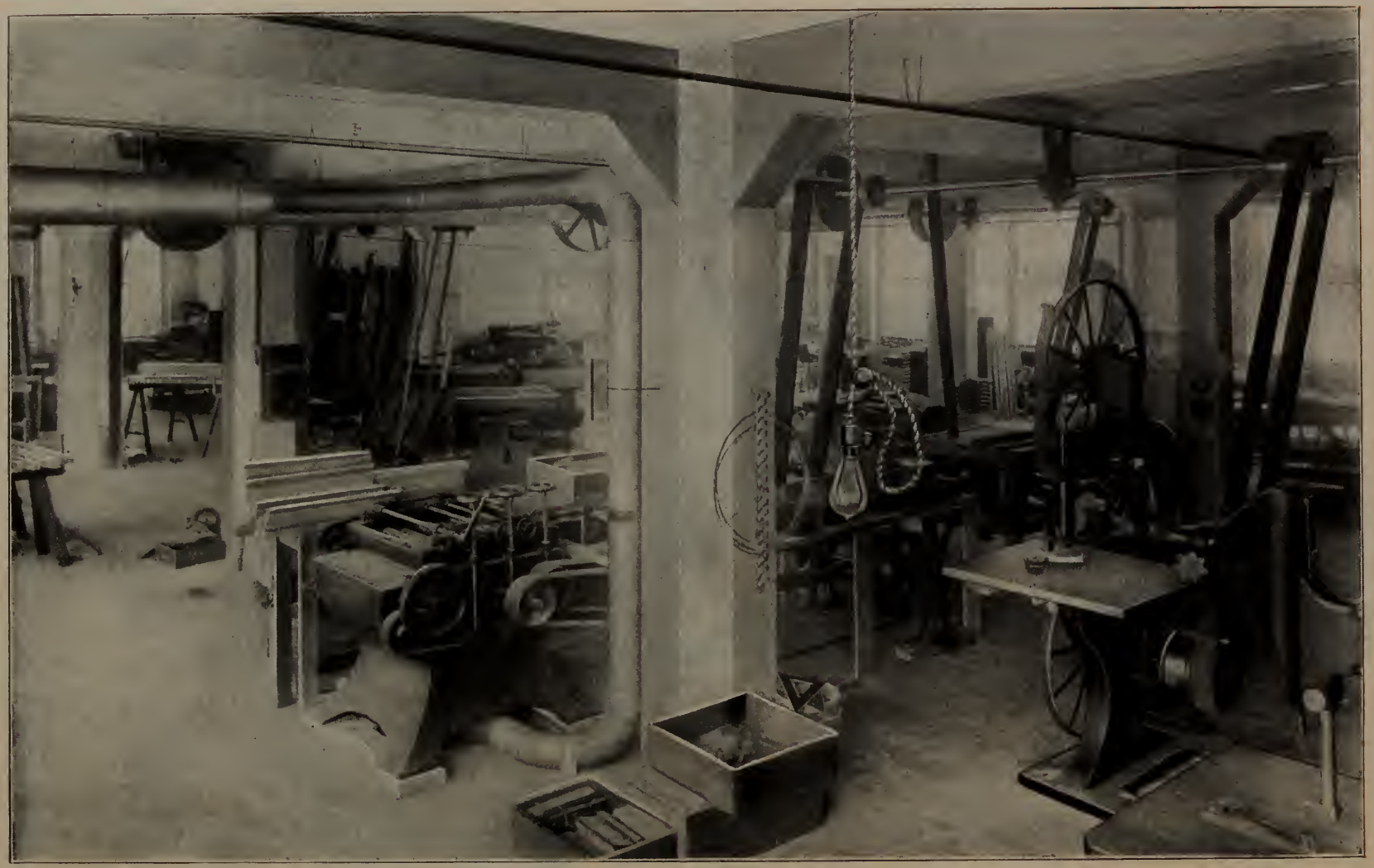
To apply the ink, which has previously been prepared on a piece of plate glass about 4 x 6 inches, invert the apparatus, press the vertical slide so that the type will project through the base, pass over the type with the ink roller, and the instrument is ready for use.

The whole instrument is made of hard brass, is nicely finished, and is packed in a neat box with one set of four dials, type-box, mould for ink rollers and two holders of ink rollers.

No. 2030. Lettering Device, complete, without type, ... Each, $36 00

The cost of type will vary according to the amount and kind, which can be selected from a catalogue of any type founder, and may range from $3 00 upward.

Secure the ink and ink rollers from a printing supply house.



CABINET SHOP AND FINISHING ROOM—FACTORY

STRAIGHT EDGES

No. 2050. Cherry or Maple, one edge beveled,

Size,	18	24	30	36	42	in.
Each,	$0 20	25	30	40	50	

No. 2051. Hardwood lined, square edges,

Size,	24	30	36	42	48	54	60	72	in.
Each,	$0 35	45	60	75	1 00	1 20	1 50	2 00	

No. 2052. Mahogany, Ebony Lined, square edges,

Size,	24	30	36	42	48	54	in.
Each,	$0 50	60	80	1 00	1 35	1 60	

No. 2056. Transparent Ambro Lined, square edges, grooved joint,

Size,	18	24	30	36	42	48	in.
Each,	$0 75	1 00	1 25	1 50	1 80	2 20	

No. 2057. Steel Straight Edges, nickel plated, one edge beveled.

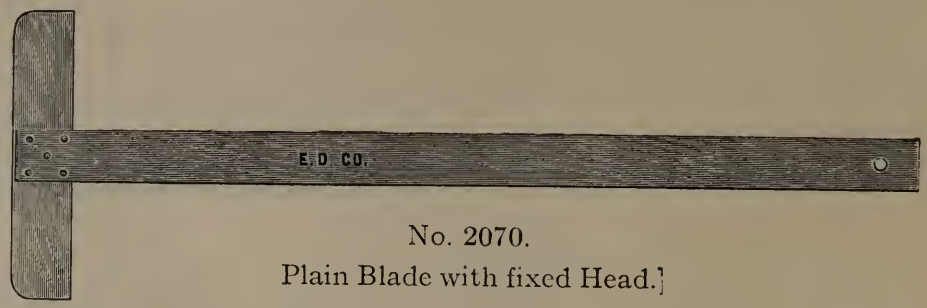
Size,	15	18	24	30	36	42	48	60	72	in.
Width,	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3	"
Thickness,	1/14	1/14	1/13	1/12	1/12	1/10	1/10	1/8	5/32	"
Each,	$1 75	2 00	3 00	4 00	5 00	6 50	8 00	11 00	15 00	

No. 2058. Steel Straight Edges, nickel plated, square edges.

Size,	15	18	24	30	36	42	48	60	72	in.
Width,	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3	"
Thickness,	1/20	1/20	1/18	1/16	1/16	1/16	1/14	1/12	1/10	"
Each,	$1 25	1 50	2 00	3 00	4 00	5 00	6 00	8 50	12 00	

WOODEN T SQUARES

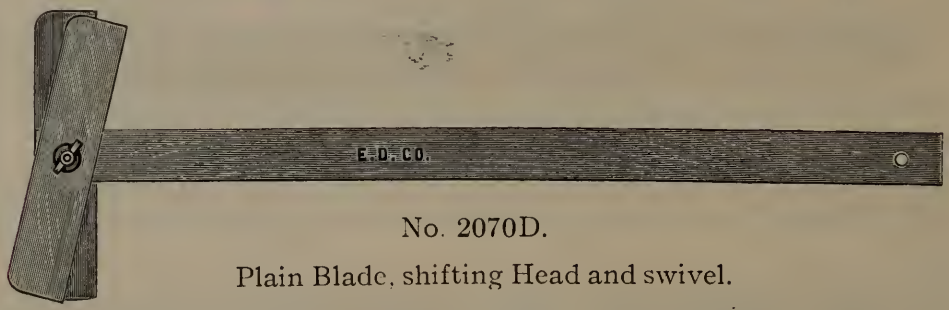
All the T Squares enumerated in this Catalogue are of our own manufacture, of best workmanship, and only thoroughly seasoned material is used in their construction.



No. 2070.

Plain Blade with fixed Head.

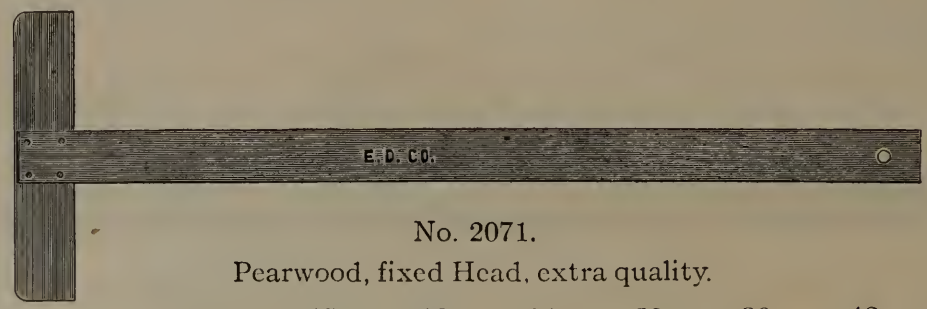
No. 2070.	Size,	15	18	24	30	36	42	48 in.
	Each,	$0 15	20	25	30	40	45	65



No. 2070D.

Plain Blade, shifting Head and swivel.

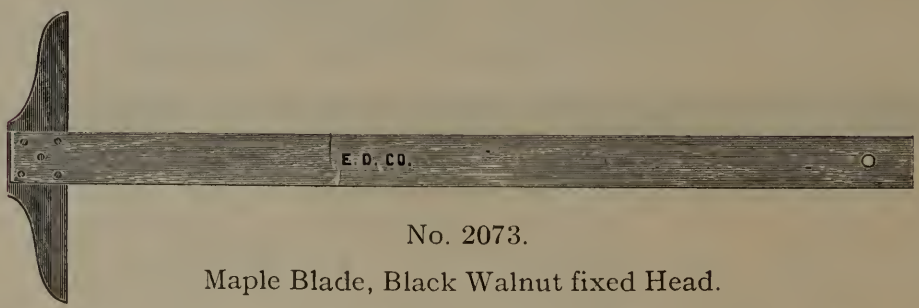
No. 2070D.	Size,	15	18	24	30	36	42	48 in.
	Each,	$0 50	60	70	80	90	1 00	1 20



No. 2071.

Pearwood, fixed Head, extra quality.

No. 2071.	Size,	15	18	24	30	36	42	48 in.
	Each,	$0 25	30	35	45	55	65	90



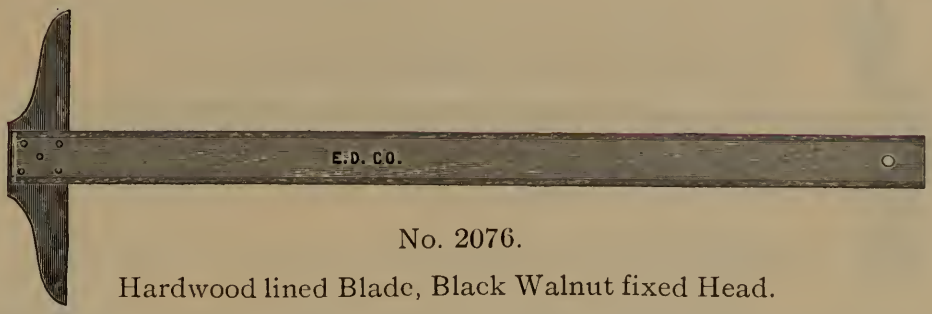
No. 2073.

Maple Blade, Black Walnut fixed Head.

No. 2073.	Size,	24	30	36	42	48	54 in.
	Each,	$0 60	75	90	1 05	1 20	1 40

WOODEN T SQUARES

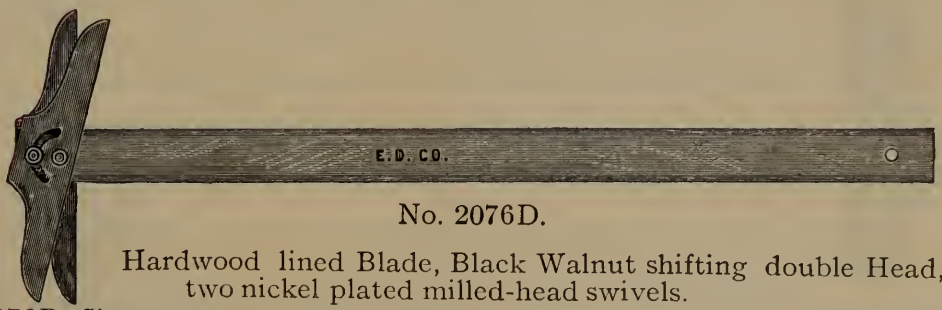
Continued



No. 2076.

Hardwood lined Blade, Black Walnut fixed Head.

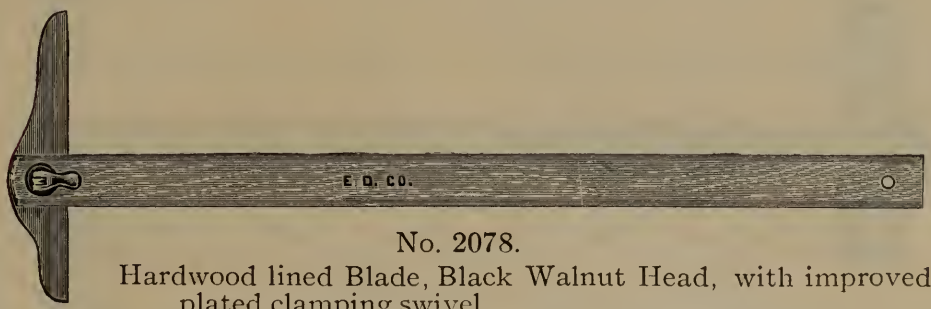
No. 2076. Size,	24	30	36	42	48	54	60	72 in.
Each,	$0 75	90	1 05	1 25	1 50	1 75	2 25	3 00



No. 2076D.

Hardwood lined Blade, Black Walnut shifting double Head, with two nickel plated milled-head swivels.

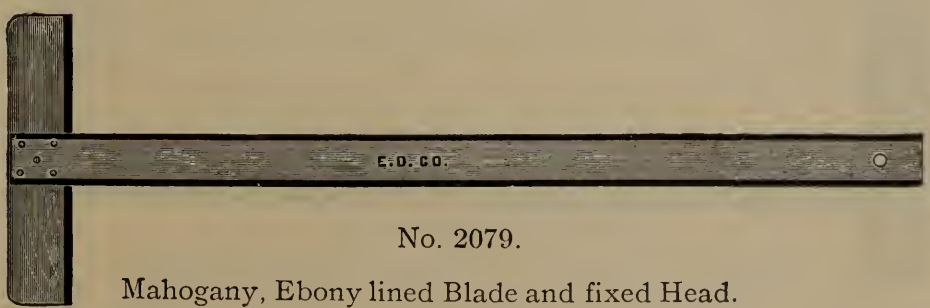
No. 2076D. Size,	24	30	36	42	48	54	60	72 in.
Each,	$1 35	1 50	1 65	1 85	2 15	2 50	3 00	4 00



No. 2078.

Hardwood lined Blade, Black Walnut Head, with improved nickel plated clamping swivel.

No. 2078. Size,	24	30	36	42	48	54	60	72 in.
Each,	$1 35	1 50	1 65	1 85	2 15	2 50	3 00	4 00



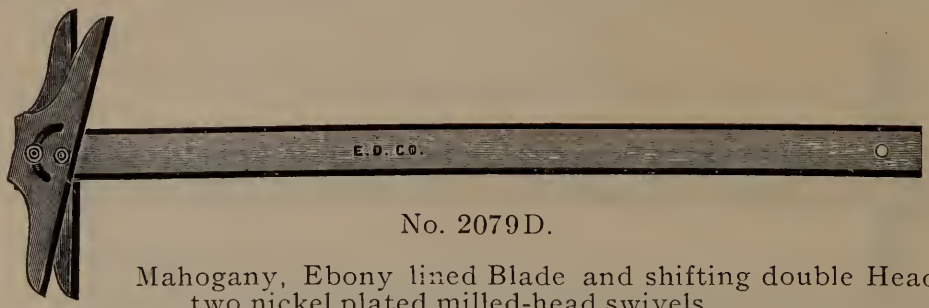
No. 2079.

Mahogany, Ebony lined Blade and fixed Head.

No. 2079. Size, .	24	30	36	42	48	54	60 in.
Each, .	$0 90	1 10	1 30	1 50	1 75	2 10	2 60

For Patent T Square Guide see No. 2100.

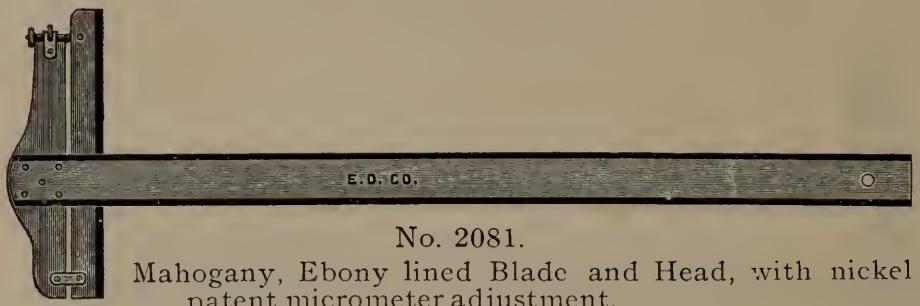
WOODEN T SQUARES *Continued*



No. 2079D.

Mahogany, Ebony lined Blade and shifting double Head, with two nickel plated milled-head swivels.

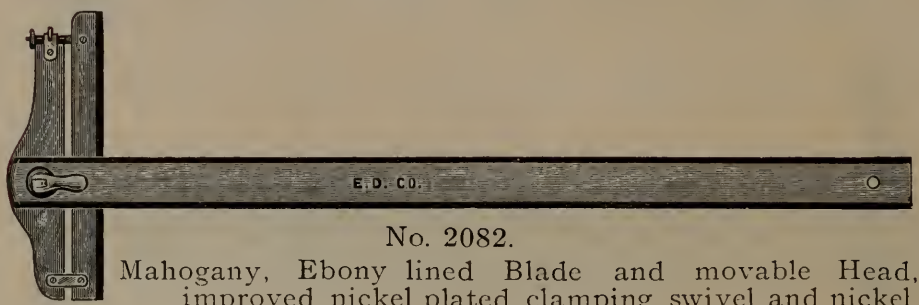
No. 2079D. Size,	24	30	36	42	48	54	60 in.
Each,	$1 75	2 00	2 25	2 50	2 80	3 25	3 90



No. 2081.

Mahogany, Ebony lined Blade and Head, with nickel plated patent micrometer adjustment.

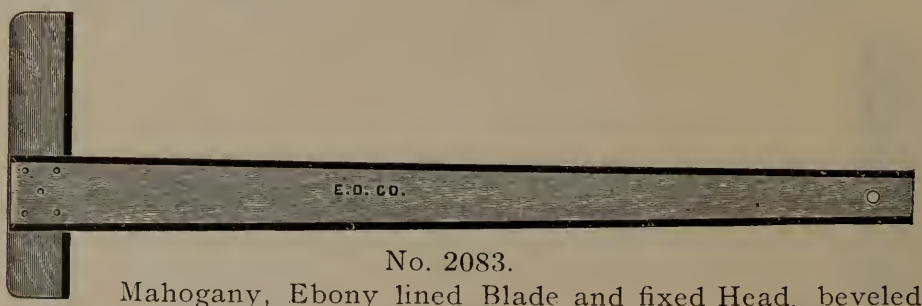
No. 2081. Size,	24	30	36	42	48	54	60 in.
Each,	$1 65	1 90	2 15	2 40	2 65	3 15	3 65



No. 2082.

Mahogany, Ebony lined Blade and movable Head, with improved nickel plated clamping swivel and nickel plated patent micrometer adjustment.

No. 2082. Size,	24	30	36	42	48	54	60 in.
Each,	$2 50	2 65	2 90	3 15	3 40	3 90	4 40



No. 2083.

Mahogany, Ebony lined Blade and fixed Head, beveled edge. The blade is tapered to prevent spring or bending.

No. 2083. Size,	30	36	42	48	54 in.
Each,	$1 20	1 40	1 60	1 85	2 25

For Patent T Square Guide see No. 2100.

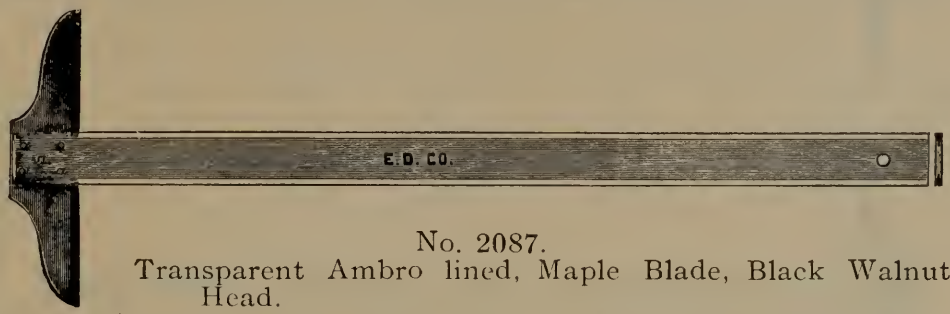
Other styles of T Squares with fixed or swivel Heads made to order at short notice.

WOODEN T SQUARES *Continued*

IMPROVED TRANSPARENT AMBRO LINED T SQUARES

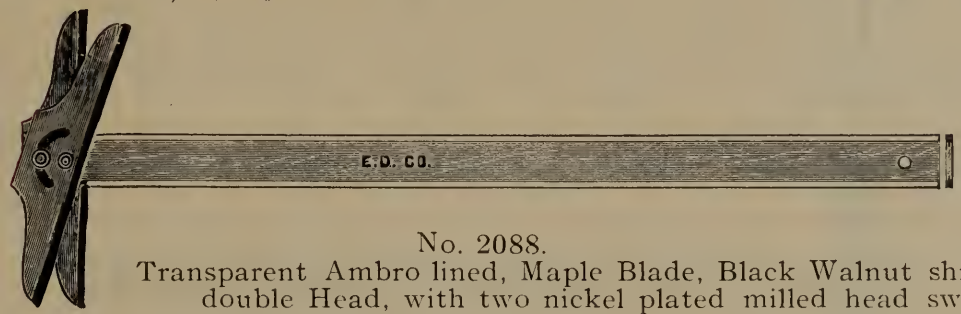
With Tongue and Groove Joint.

The principal advantage of this improved construction lies in the fact that the gluing surface has been almost doubled, thereby lessening the liability of blade warping, and at the same time absolutely eliminating all possibility of the celluloid strip from becoming detached from the wooden blade.



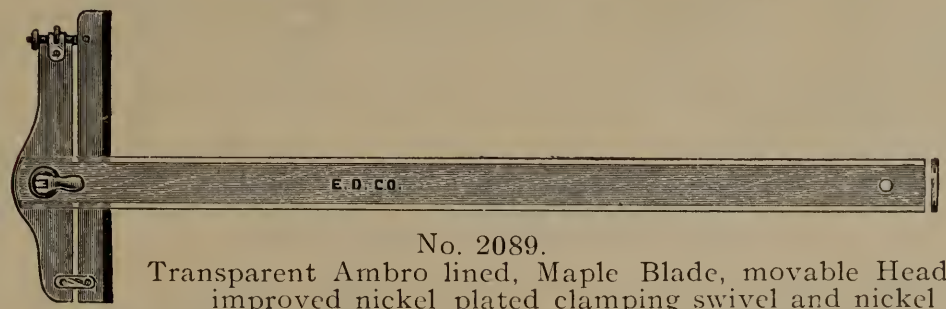
No. 2087.
Transparent Ambro lined, Maple Blade, Black Walnut fixed Head.

No 2087.	Size,	18	24	30	36	42	48	54	60in.
	Each,	$1 10	1 50	1 85	2 15	2 50	3 00	4 00	5 00



No. 2088.
Transparent Ambro lined, Maple Blade, Black Walnut shifting double Head, with two nickel plated milled head swivels. The 18 in. squares have one swivel.

No. 2088.	Size,	18	24	30	36	42	48	54	60 in.
	Each,	$1 90	2 45	2 80	3 20	3 60	4 20	5 25	6 25



No. 2089.
Transparent Ambro lined, Maple Blade, movable Head, with improved nickel plated clamping swivel and nickel plated patent micrometer adjustment.

No. 2089.	Size,	24	30	36	42	48 in.
	Each,	$3 15	3 50	3 90	4 35	5 00

ORDINARY TRANSPARENT AMBRO LINED T SQUARES

With Plain Glued Joint.

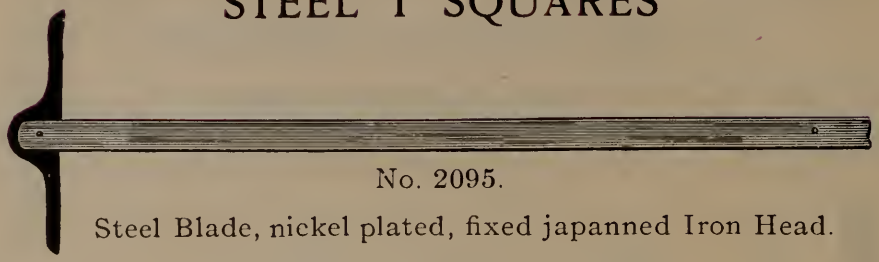
No. 2091. Transparent Ambro lined, fixed Head, like No. 2087, but with plain glued joint.

Size,	18	24	30	36	42	48 in
Each,	$0 90	1 25	1 50	1 75	2 00	2 50

No 2092. Transparent Ambro lined, shifting double Head, like No. 2088, but with plain glued joint

Size,	18	24	30	36	42	48 in
Each,	$1 65	2 10	2 40	2 70	3 00	3 60

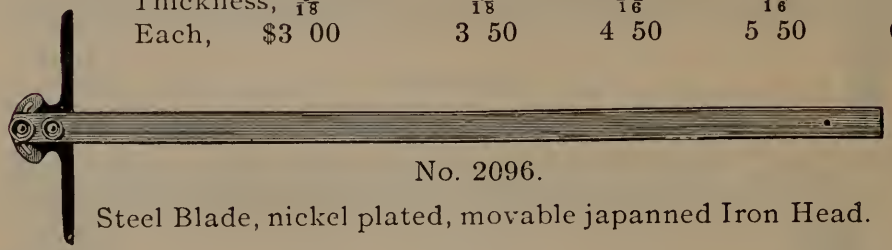
STEEL T SQUARES



No. 2095.

Steel Blade, nickel plated, fixed japanned Iron Head.

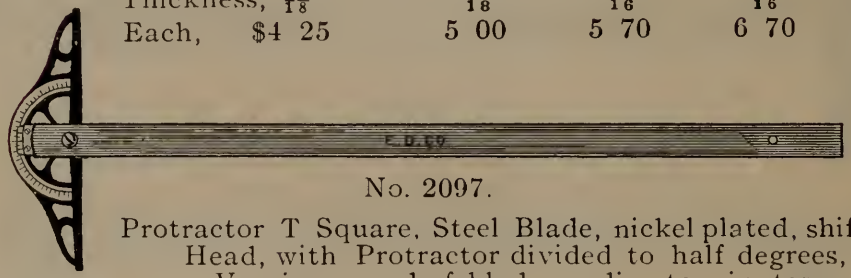
No. 2095. Size,	18	24	30	36	42 in.
Width,	1¼	1¼	1½	1½	1¾ "
Thickness,	1/18	1/18	1/16	1/16	1/14 "
Each,	$3 00	3 50	4 50	5 50	6 50



No. 2096.

Steel Blade, nickel plated, movable japanned Iron Head.

No. 2096. Size,	18	24	30	36	42 in.
Width,	1¼	1¼	1½	1½	1¾ "
Thickness,	1/18	1/18	1/16	1/16	1/14 "
Each,	$4 25	5 00	5 70	6 70	7 70



No. 2097.

Protractor T Square, Steel Blade, nickel plated, shifting Head, with Protractor divided to half degrees, Vernier on end of blade reading to minutes.

No. 2097. Size,	24	30	36	42 in.
Width,	1¼	1½	1½	1¾ "
Thickness,	1/18	1/16	1/16	1/14 "
Each,	$8 50	9 50	10 50	11 50

ENGRAVERS' T SQUARES

No. 2098.

No. 2099.

Engravers' T Square, Steel Blade, fixed Head.

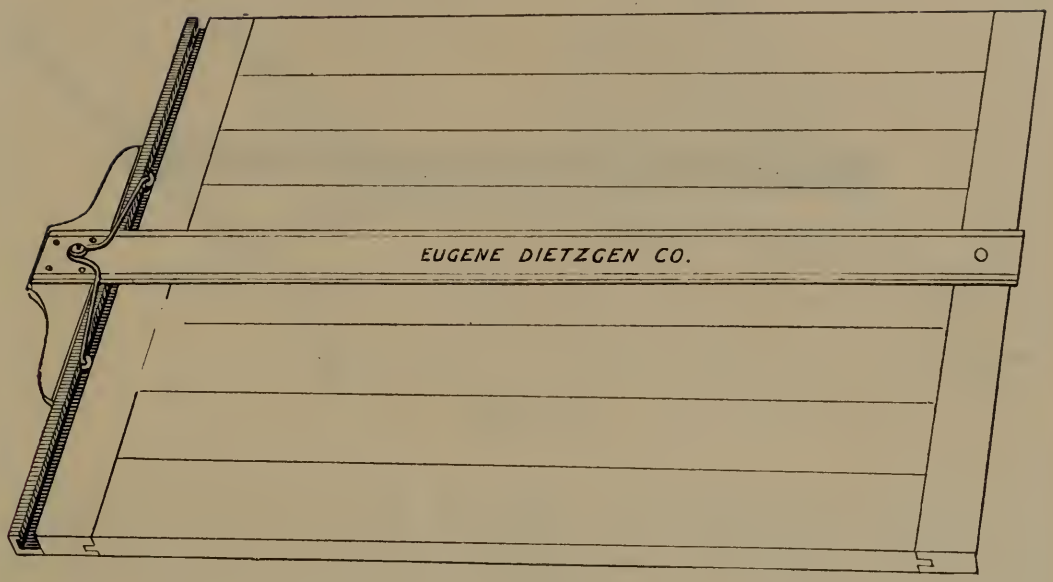
No. 2098. Size,	6	8	10	12 in.
Each,	$1 25	1 50	2 00	2 50

Engravers' T Square, Steel Blade, shifting Head, with swivel.

No. 2099. Size,	6	8	10	12 in.
Each,	$1 50	1 75	2 25	2 75

E. D. CO.'S T SQUARE GUIDE

Patented March 4, 1902.



No. 2100.

No. 2100. T Square Guide, nickel plated, with wooden guide strip, . Each, $1 00

In ordering, please state length of guide strip wanted, which should be full width of drawing board, or longer, if desired, so that square can be moved to extreme end of board.

This is a simple and novel attachment by means of which any ordinary fixed-head T square can be transformed into a perfect parallel ruler with but little trouble and expense. The Guide consists of a nickel-plated spring, made in a strong and substantial manner, having branching arms provided at their extremities with suitable guide rollers, and a guide strip made of hardwood The spring is screwed to fixed head T squares, as shown in illustration, and travels along the wooden guide strip, which is attached to edge of drawing board.

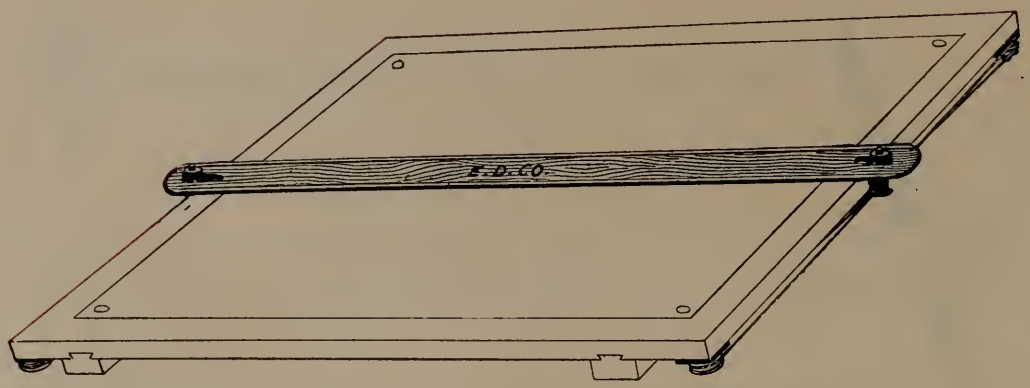
The resilience of spring, which can be easily regulated, permits the T square to move freely along the board, and the friction between head of square and guide strip due to the pressure of the rollers, will hold the square in proper position upon the board when the latter is inclined at an angle.

The draftsman is thus relieved of the constant annoyance of the slipping of the T square, which can be moved at pleasure, and still retain a true line; and, as the draftsman is allowed the free use of both hands, it thus greatly facilitates quick and accurate drafting.

There is no string or wire to break or get out of order, and it requires but a moment to attach or detach our outfit from T square or board.

For T Squares see pages 226-230.

PARALLEL RULING ATTACHMENTS



No. 2102.

Our Attachments are of simple construction, neat in appearance, consisting of perfectly constructed brass wheels, mounted on plates, with best quality braided silk line or wire, and a perfect clamping device for clamping same to straight edge. They are easily attached to any drawing board having ledges beneath, or on any frame having an opening into which a drawing board can be placed.

We furnish the Attachments with or without Straight Edge.

ATTACHMENTS ONLY.

	For Drawing Boards, . .	24	31	42	55	60 in. long.
No. 2101.	Attachments, . . . Each,	$4 00	4 10	4 25	4 40	4 50

STRAIGHT EDGES AND ATTACHMENTS.

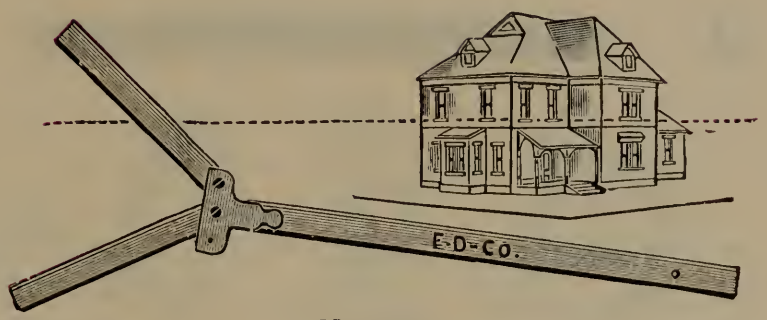
	For Drawing Boards, . .	24	31	42	55	60 in. long.
No. 2102.	Attachm'ts with Hardwood Lined Straight Edge, Each,	$4 50	4 90	5 40	6 10	6 75
2103.	Attachm'ts with Mahogany Ebony Lined St. Edge, Each,	4 75	5 15	5 75	6 70	7 25
2104.	Attachm'ts with Transparent Ambro Lined St. Edge, Each,	5 50	6 00	6 75	8 50	9 50

In ordering Attachments, please state thickness of board and in ordering Straight Edges state exact length of board.

Full directions furnished with each outfit.

For Drawing Boards see pages 247-248.

PERSPECTIVE LINEADS

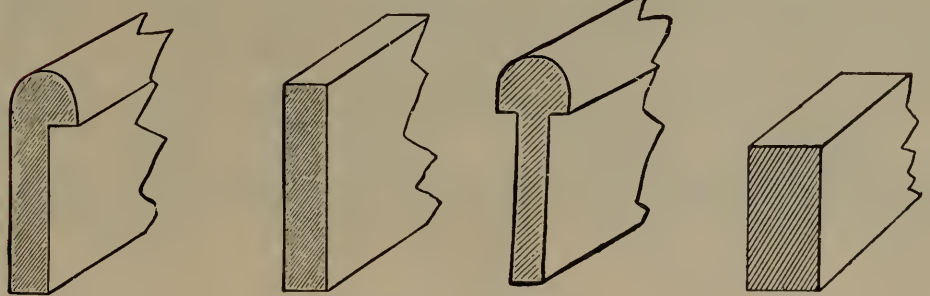


No. 2105.

No. 2105.	Perspective Linead or Centrolinead, mahogany, ebony lined, nickel plated swivels, with two studs, blade 24 in., arms 10 in., ...	Each, $3 00
2106.	Same as No. 2105, with blade 30 in., arms 11 in., .	" 3 50
2107.	Same as No. 2105, with blade 36 in., arms 12 in., .	" 4 00

DIRECTIONS FOR USING NOS. 2105-2107.—Both edges of the blade are used for drafting. Above cut shows position in drawing from the left. To draw from the right it is only necessary to move the upper arm with the swivel to the lower end of the blade head.

BARS FOR BEAM COMPASSES



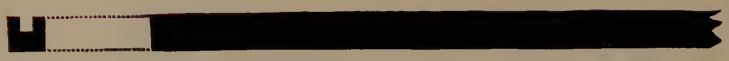
No. 2119. Style No. 1. No. 2. No. 3. No. 4. (For No. 783)

Bars for Beam Compasses, made of hardwood.

No. 2119. Style No. 1, 2, 3 or 4.

Size, . .	24	30	36	42	48	60 in.
Each, . .	$0 25	30	35	40	50	65

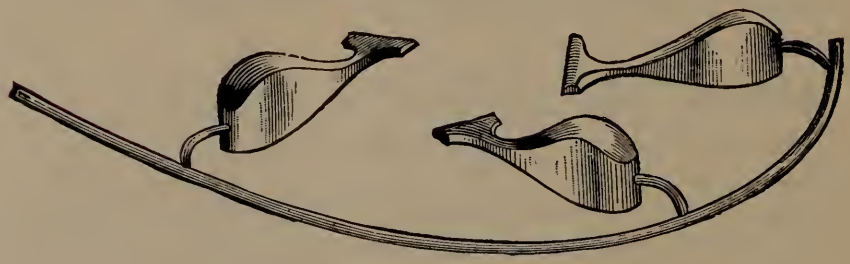
SPLINES



No. 2126.

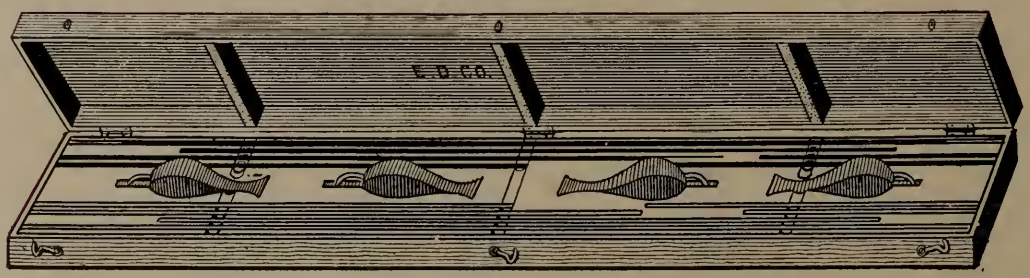
		Size,	24	30	36	42	48	60 in.
No. 2125.	Pearwood Splines, . .	Each, $0	15	20	25	30	35	45
2126.	Black Ambro Splines, .	"	25	35	40	45	50	
2127.	Transparent Ambro Splines,	"	40	45	50	55	60	

WEIGHTS FOR SPLINES



No. 2130.

No. 2130. Weights for Splines, with finger, about 3½ lbs., . . Each, $0 85
2131. " " " " " " 5 " . . " 1 00

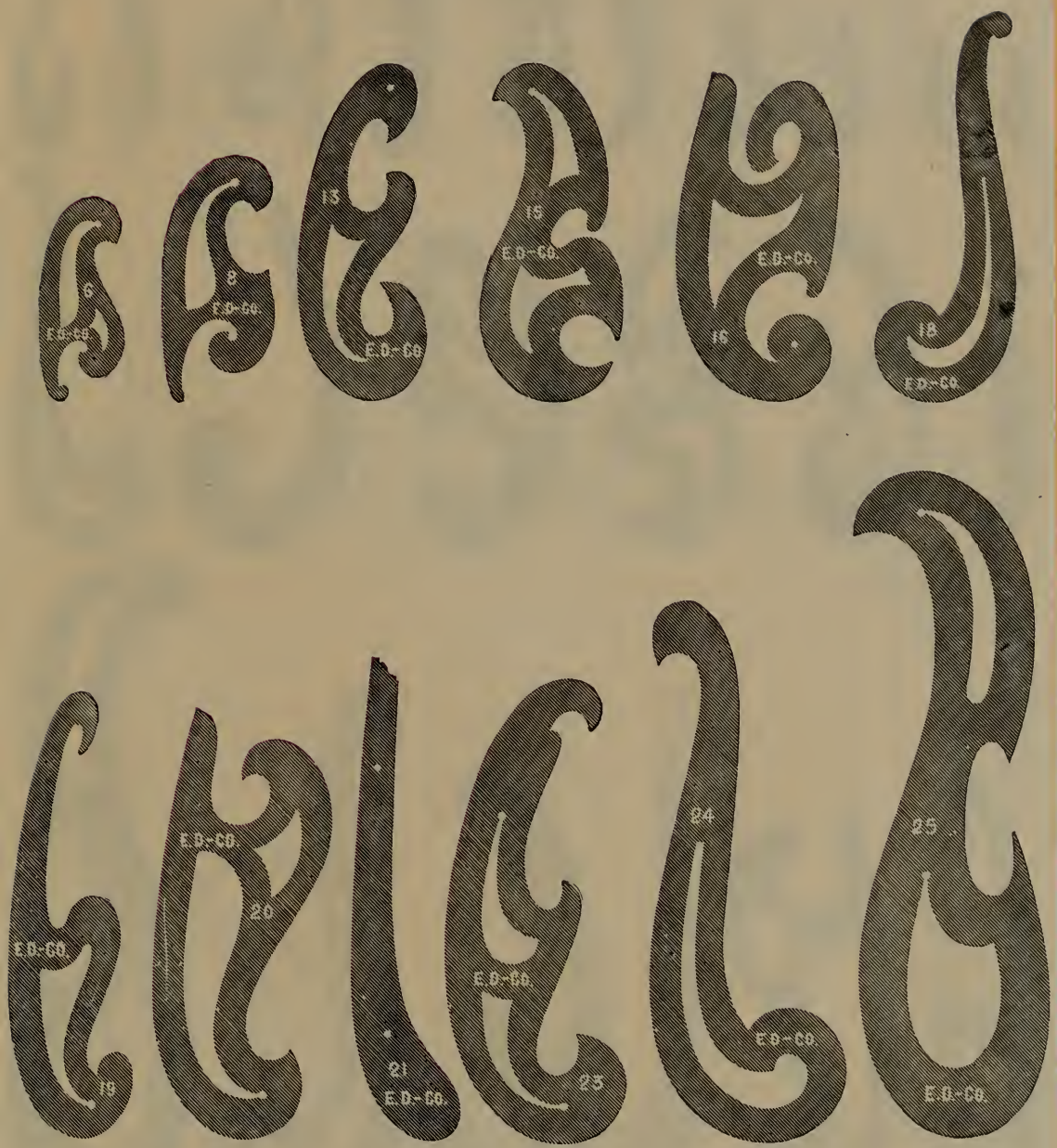


No. 2135.

No. 2135. Set of Splines and Spline Weights, containing:
4 Spline Weights, No. 2130.
1 each Pearwood Splines, No. 2125–12, 18, 24, 30, 36, 48 in.
1 " Black Ambro Splines, " 2126–12, 18, 24, 30, 36, 42 "
In strong wooden box, ... Per set, $10 00

IRREGULAR WOODEN CURVES

Illustrations ⅕ to ⅛ size.



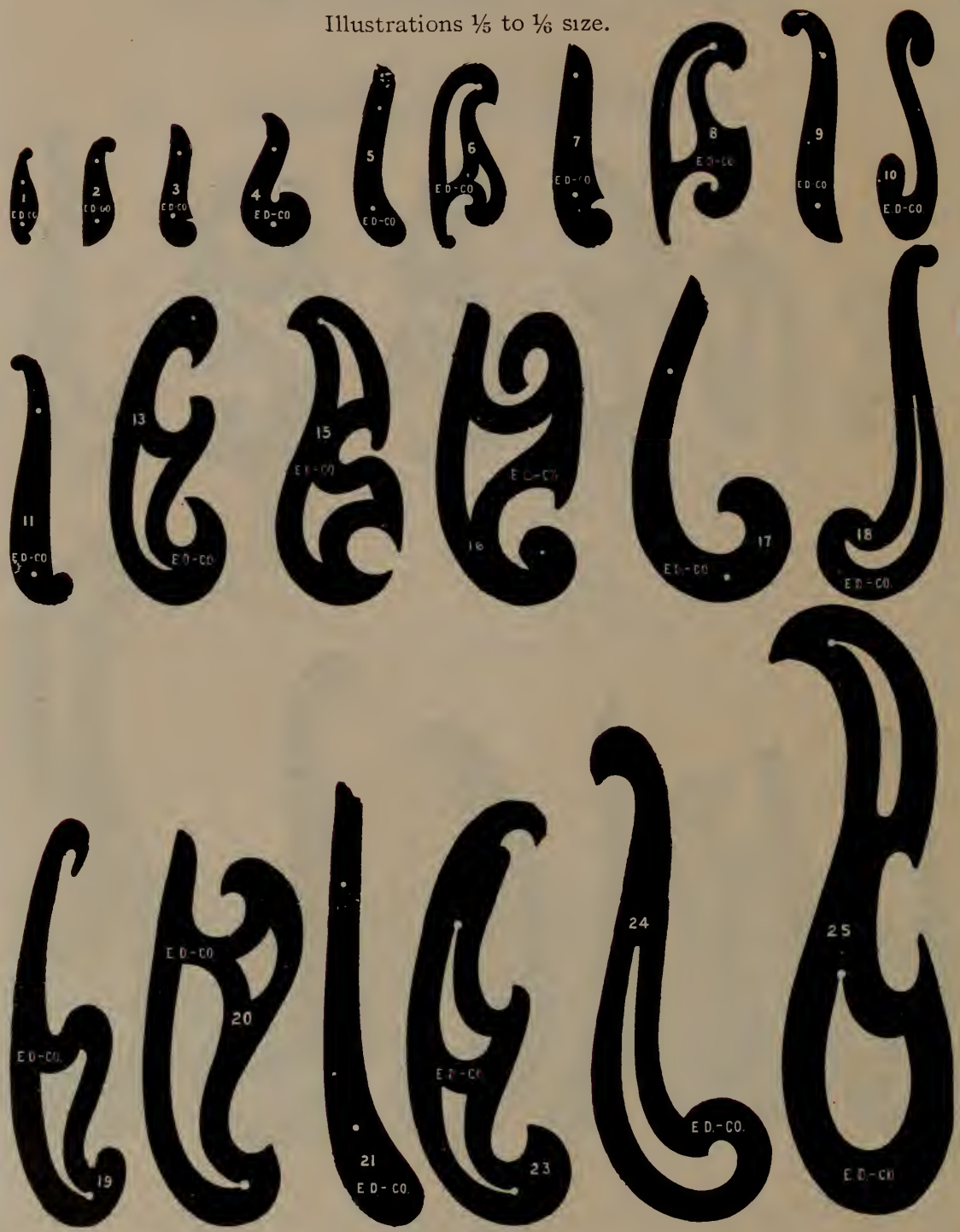
No. 2150.

No. 2150. Pearwood Curves.

Nos. . .	6	8	13	15	16	18
Each, . .	$0 15	20	25	25	25	25
Nos. . .	19	20	21	23	24	25
Each, . .	$0 30	30	25	35	35	40

BLACK AMBRO CURVES

Illustrations ⅕ to ⅛ size.



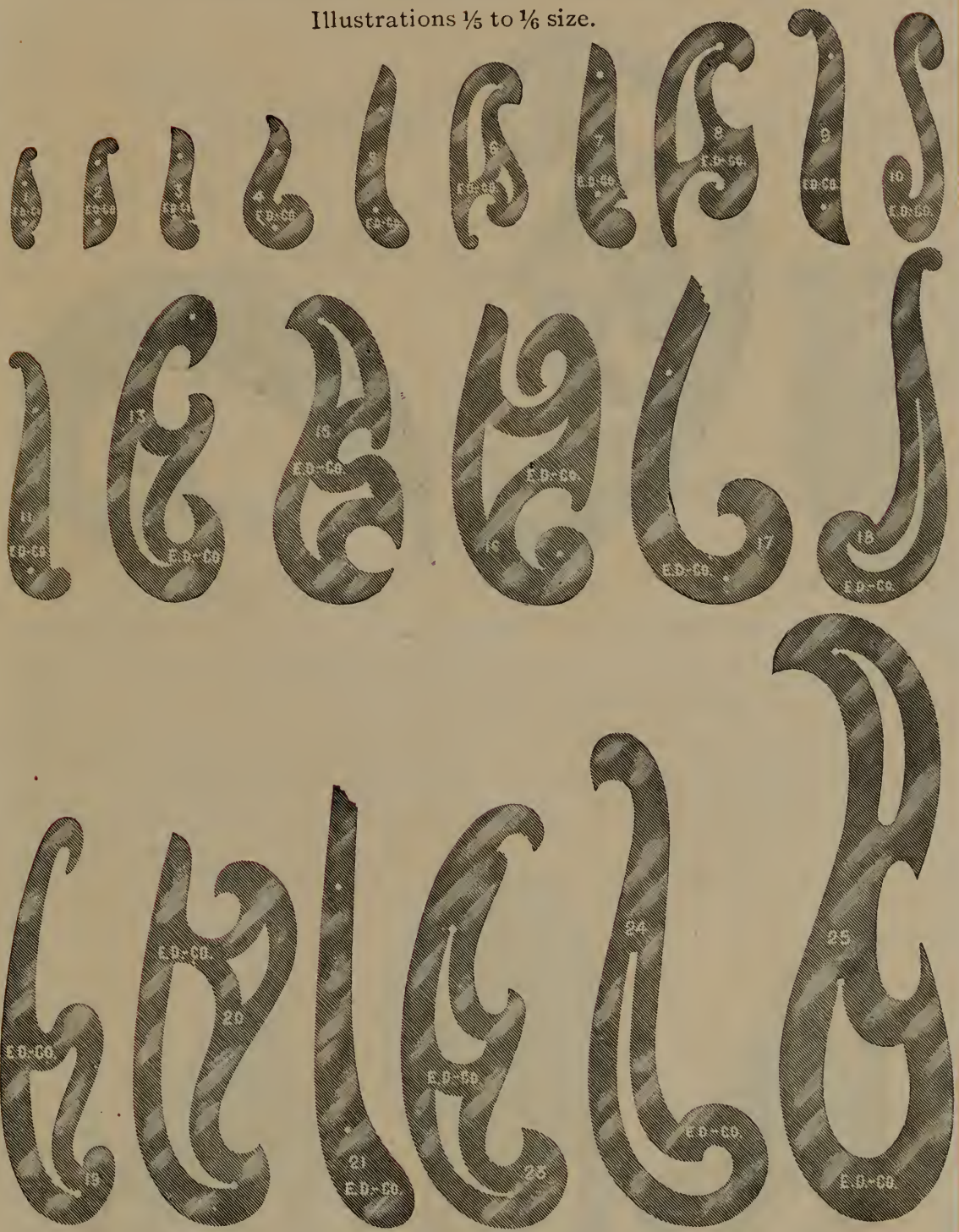
No. 2151.

No. 2151. Black Ambro Curves.

Nos.	1	2	3	4	5	6	7	8	9	10	11
Each,	$0 30	30	30	30	30	30	30	35	30	30	30
Nos.	13	15	16	17	18	19	20	21	23	24	25
Each,	$0 40	40	45	45	40	50	55	40	65	65	1 00

TRANSPARENT AMBRO CURVES

Illustrations ⅓ to ⅙ size.



No. 2152.

No. 2152. Transparent Ambro Curves.

Nos.	1	2	3	4	5	6	7	8	9	10	11
Each,	$0 35	35	35	40	40	45	45	50	50	50	50
Nos.	13	15	16	17	18	19	20	21	23	24	25
Each,	$0 60	60	60	60	60	75	90	60	90	90	1 50

TRANSPARENT AMBRO CURVES

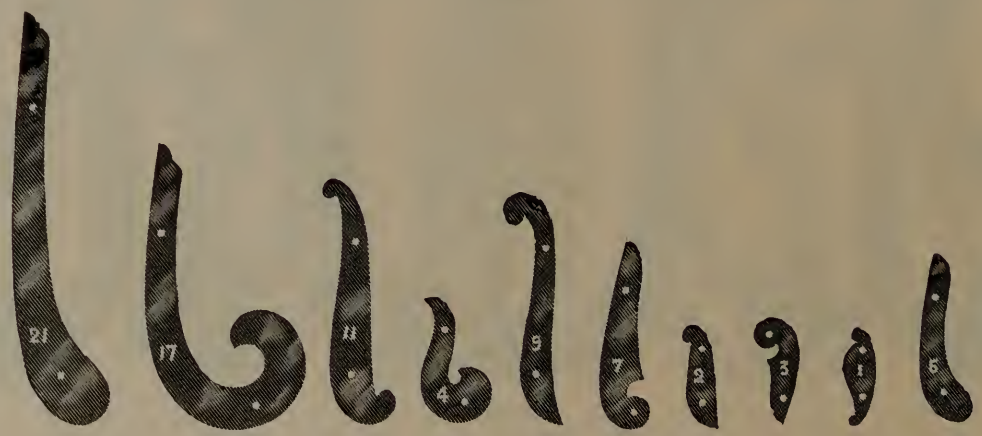
Continued

No. 2154–27. 2154–30. 2156.

No. 2153-27.	Combination Curve of Black Ambro, ...	Each,	$0 75
2154-27.	" " " Transparent Ambro, . .	"	1 00
2154–30.	" " " " " . .	"	1 80
2156.	Logarithmic Spiral Curve of " " . .	"	1 75

No. 2156 is mathematically constructed and contains every curve, only limited by its size. If properly used according to very explicit directions furnished with each, the most difficult calculations can be made with it.

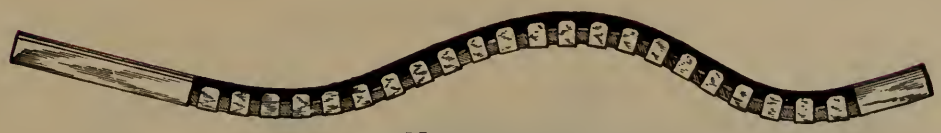
CURVES FOR MECHANICAL ENGINEERS



No. 2158.

No. 2158.	Transparent Ambro Curves for Mechanical and Civil Engineers. Per set of 10 Curves in polished wooden box, . .	$4 80
2159.	Same Curves, of Black Ambro, Per set, ...	3 75

ADJUSTABLE CURVE RULERS



No. 2160.

No. 2160. Adjustable Curve Ruler, 14½ in. long, ... Each, $2 25

No. 2161.

No. 2161. Adjustable Curve Ruler, 30 in. long, ... Each, $3 30

No. 2165.

No. 2165.	Adjustable Curve Ruler, Double Edge,	7	in. long,	.	Each,	$0	42
2166.	"	"	"	"	"	15	"	"	.	"		87
2167.	"	"	"	"	"	31	"	"	.	"	1	70

The above Rules can be instantly adjusted and retained to any form or curve. The working edge is made rounded, so that by slightly inclining the pencil two or more parallel curves can be drawn without moving the ruler.

ELLIPSES, HYPERBOLAS AND PARABOLAS

No. 2172.

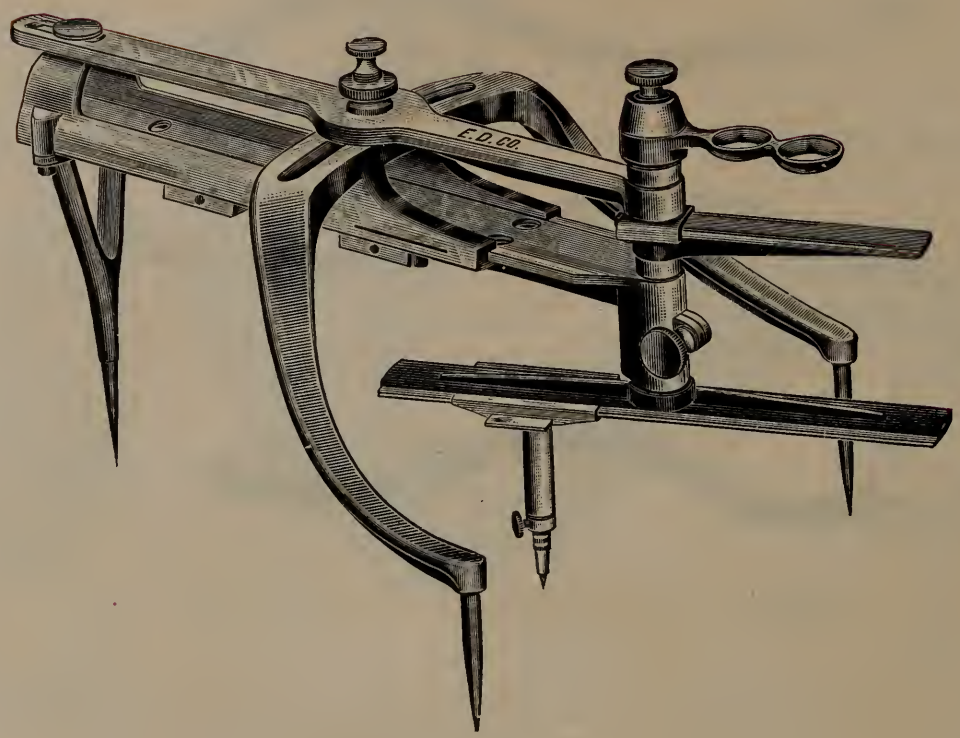
2170.

2173.

								Per set.
No. 2170.	Hard Rubber Ellipses,	10	in set, from	1½	to	6	in., .	$2 50
2171.	" " "	6	" " "	2	"	4½	" .	1 50
2172.	Hard Rubber Hyperbolas,	8	" " "	2	"	5½	" .	2 25
2173.	Hard Rubber Parabolas,	8	" " "	1¼	"	5½	" .	2 25
2174.	" " "	8	" " "	3¼	"	14¼	" .	5 00

STARR'S ELLIPSOGRAPH

Patented, January 29, 1895.



No. 2190.

The above illustration represents a new style of Ellipsograph, an instrument designed to facilitate the drawing of ellipses. By an ingenious combination of mechanical movements this has been accomplished in the most perfect manner and the laborious task of drawing true ellipses has been reduced to a mere mechanical operation.

The construction of this instrument in its essential parts consists of a frame supported on three steel needle-pointed legs and of a horizontal slide, to which are attached the cross-bars, the lower one carrying the adjustable pencil and pen holder, and to the upper cross-bar is fitted a T-slotted slide, the stem of which passes through the top guide bar and forms the supplementary axis for the horizontal slide.

The manipulation of the instrument may readily be understood by referring to the above cut. The needle-pointed legs are the true centres of the instrument. To place the apparatus in position, it is only necessary to draw a line for the major and minor axis of the ellipse. To set the pen or pencil to describe the correct size, proceed thus:

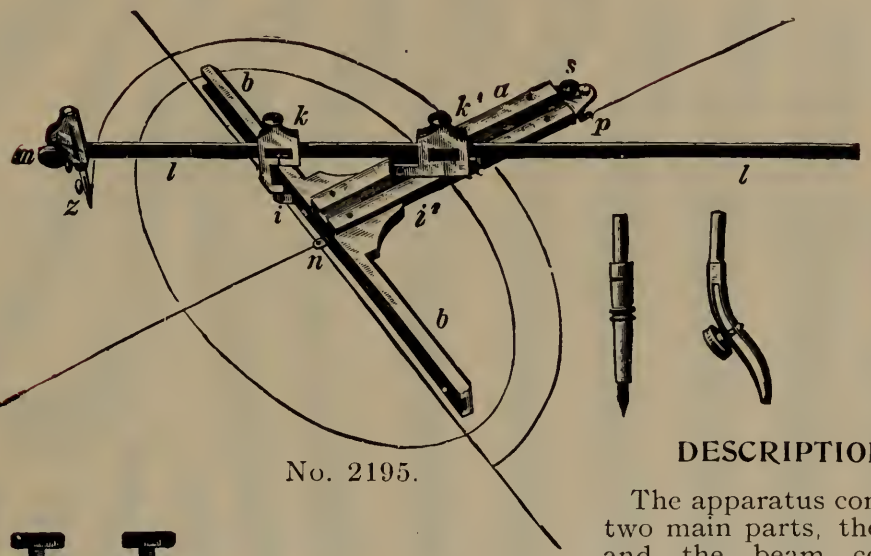
Set the lower cross-bar parallel to the minor axis of the ellipse, move the pencil point to correspond to the desired size, then swing the arm carrying the pencil to major axis, loosen the thumb-screw which secures the T-slotted stem to the upper cross-bar, draw out the main slide to the point previously determined, clamp again, lower the pencil or pen, as the case may be, and the instrument is ready to perform the operation by simply turning the handle-bar in azimuth.

The principal advantages of this instrument over any other form of ellipsograph are: 1st, ellipses can be drawn with greater accuracy and rapidity; 2d, it will describe full ellipses without changing position of the instrument; 3d, ellipses of any proportion may be drawn, from a straight line or point to a perfect circle; the largest ellipse $5\frac{1}{8}$ x 11 inches and the largest circle about 6 inches diameter; 4th, it will describe parallel lines; 5th, it can be used with an inking pen which has been specially devised for the apparatus.

The whole instrument is accurately and substantially made, which insures durability; all of the metal parts are nicely finished and nickel-plated.

No 2190. Starr's Ellipsograph, with pencil and pen point (patented January 29, 1895), packed in a fine mahogany case, Each, $50 00

ELLIPSOGRAPH AND BEAM COMPASS COMBINED



No. 2195.

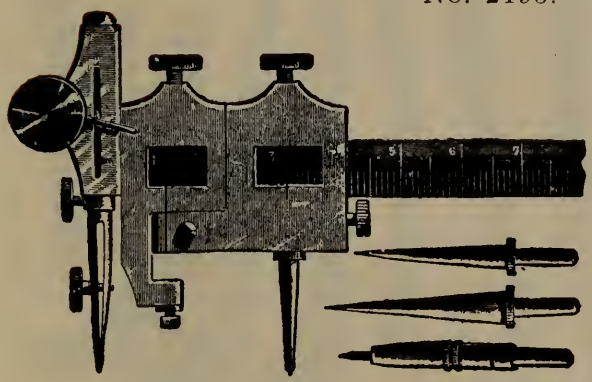


Fig. 1.

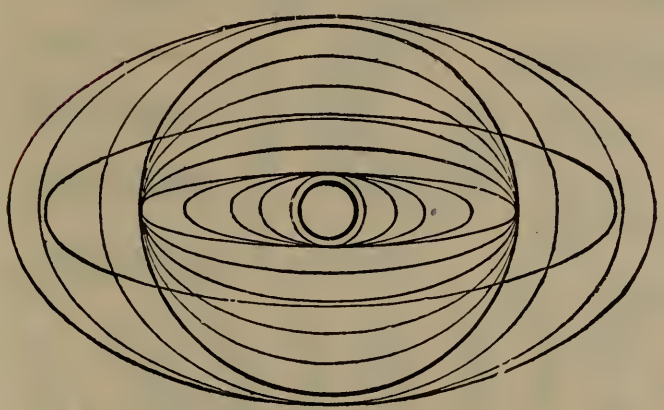


Fig. 2.

DESCRIPTION.

The apparatus consists of two main parts, the frame and the beam compass. The former forms a T with slots in both arms in which the clamps *i* and *ji* slide; these hold the beam *l-l* with pen or pencil *z*; it is divided and can be adjusted in the clamps and secured with the screws *k* and *k*; the frame can be separated in two parts *a* and *b* for keeping in a case.

For use, the frame is set and screwed together and the middle part at *n* set in the center of the intended ellipse, the front edge of the arm *b-b* to cover exactly the major axis; then secure in position by screwing down *s* till needle point of the same pierces the paper; adjust the beam *l* in clamp *i* to the length of minor axis and secure with screw *k*; then adjust beam in clamp *i* to the length of major axis, adding 20 mm. to the same, the axis of this clamp being so much nearer to the drawing point, and secure with screw *k*; set pen or pencil *z* to correct height by means of screw *m* and draw one-half of the ellipse; after this, lift drawing point *z*, release screw *p*, reverse the instrument by swinging it 180 degrees around point *n*, reset screw *p* and drawing point *z*, and draw other half.

The instrument permits to draw all kinds of ellipses and circles, from 10 to 560 mm. major diameter: the pen with bent point to be used for ellipses of less than 22 mm. diameter.

Fig. 1 shows the Beam Compass alone. Fig. 2 shows some examples.

No.2195. Ellipsograph and Beam Compass combined, complete, in case, Each, $25 00

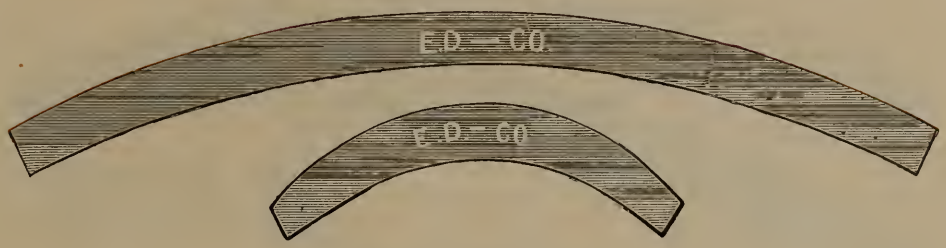
COPENHAGEN SHIP CURVES

Nos. 2202-2204.

No. 2202.	Of **Wood,** per set of above 45 Curves, in case, . .	Each,	$18 00
2203.	Of **Hard Rubber,** per set of above 45 Curves, in case,	"	30 00
2204.	Of **Transparent Ambro,** per set of above 45 Curves, in case	"	35 00

RAILROAD CURVES

Of Wood and Card Board.



Nos. 2220–2224.

WOODEN RAILROAD CURVES.

No. 2220. Wooden Railroad Curves, 10 in set, 12 to 120 inches radius, viz.: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120 in., in wooden box, Per set, $ 3 50

2222. Wooden Railroad Curves, 17 in set, 12 to 60 inches radius, viz.: 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60 in., in wooden box, ... Per set, 6 00

2224. Wooden Railroad Curves, 44 in set, 3 to 200 inches radius, viz.: 3, 3½, 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 8½, 9, 9½, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 42, 48, 54, 60, 66, 72, 78, 84, 90, 100, 110, 120, 130, 140, 160, 180, 200 inches, in wooden box, . Per set, 12 00

CARD BOARD RAILROAD CURVES.

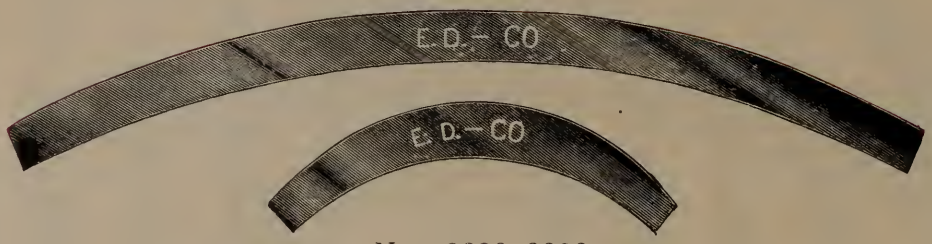
No. 2227. Card Board Railroad Curves, 30 in set, viz.: 1½, 2, 2½, 3, 3½, 4, 4½, 5, 5½, 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 35, 40, 45, 50, 60 inches radius, in wooden box, ... Per set, $ 5 25

2228. Card Board Railroad Curves, 50 in set, viz.: 1½, 2, 2½, 3, 3½, 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 8½, 9, 9½, 10, 10½, 11, 11½, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120 inches radius, in wooden box, . Per set, 8 50

2229. Cardboard Railroad Curves, 100 in set, viz.: 1½, 2, 2½, 3, 3½, 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 8½, 9, 9½, 10, 10½, 11, 11½. 12, 12½, 13, 13½, 14, 14½, 15, 15½, 16, 16½, 17, 17½, 18, 18½, 19, 19½, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120, 130, 140, 150, 160, 180, 200, 220, 240 inches radius, in wooden box, Per set, 14 50

RAILROAD CURVES *Continued*

METAL RAILROAD CURVES.



Nos. 2230–2232.

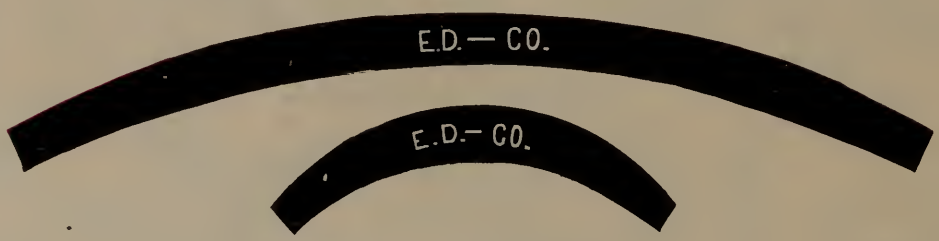
No. 2230. Metal Railroad Curves, 10 in set, 12 to 120 in. radius, viz.: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120 in., in wooden box, Per set, ... $ 6 00

2232. Metal Railroad Curves, 17 in set, 12 to 60 in. radius, viz.: 12, 15, 18, 21, 24, 27, 30 33, 36, 39, 42, 45, 48, 51, 54, 57, 60 in , in wooden box,. . . . . Per set, 10 80

Single Railroad Curves of Metal, ... Each, 80

Any other sets containing up to 100 curves, furnished to order.

HARD RUBBER RAILROAD CURVES.



Nos. 2240–2244.

No. 2240. 10 Curves in set, 12 to 120 inches radius, viz.: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120 inches, in wooden box, . . Per set, $6 50

2242. 17 Curves in set, 12 to 60 in. radius, viz.: 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60 in., in wooden box, ... Per set, 12 00

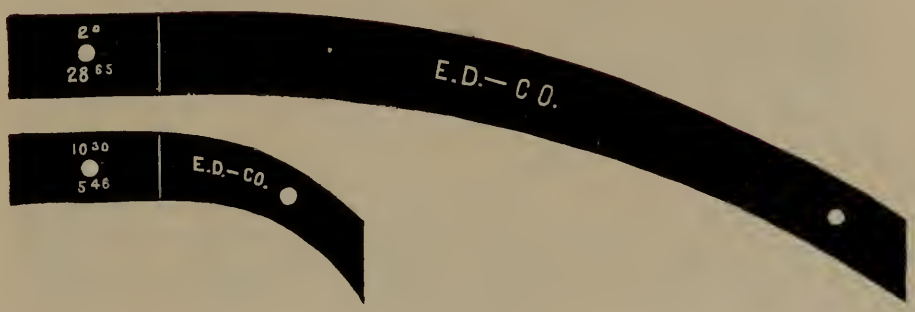
2244. 40 Curves in set, 3 to 120 in. radius, viz.: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114, 120 in. radius; 1 Curve 1° to 100 feet, Scale 57.30 in.; 1 Curve 2° to 100 feet, Scale 28.65 in., in wooden box with partition, Per set, 25 00

Single Railroad Curves of Hard Rubber, . . . Each, 80

Railroad Curves of any desired scale cut to order.

RAILROAD CURVES *Continued*

Of Hard Rubber with Tangent.



No. 2248.

No. 2248. Hard Rubber Railroad Curves, ***with Tangent,*** 41 in set, marked in degrees and inches to 100 feet scale, viz.:

0° 30′=114.59 in.	4° 15′=13.48 in.	7° 45′=7.40 in.
1° 00′= 57.30 "	4° 30′=12.73 "	8° 00′=7.17 "
1° 15′= 45.84 "	4° 45′=12.07 "	8° 15′=6.95 "
1° 30′= 38.20 "	5° 00′=11.46 "	8° 30′=6.75 "
1° 45′= 32.74 "	5° 15′=10.92 "	8° 45′=6.55 "
2° 00′= 28.65 "	5° 30′=10.42 "	9° 00′=6.37 "
2° 15′= 25.47 "	5° 45′= 9.97 "	9° 15′=6.20 "
2° 30′= 22.92 "	6° 00′= 9.55 "	9° 30′=6.04 "
2° 45′= 20.84 "	6° 15′= 9.17 "	9° 45′=5.88 "
3° 00′= 19.10 "	6° 30′= 8.82 "	10° 00′=5.74 "
3° 15′= 17.63 "	6° 45′= 8.49 "	10° 30′=5.48 "
3° 30′= 16.37 "	7° 00′= 8.19 "	11° 00′=5.22 "
3° 45′= 15.28 "	7° 15′= 7.91 "	11° 30′=4.99 "
4° 00′= 14.33 "	7° 30′= 7.64 "	

In wooden box with partition, ... Per set, $30 00

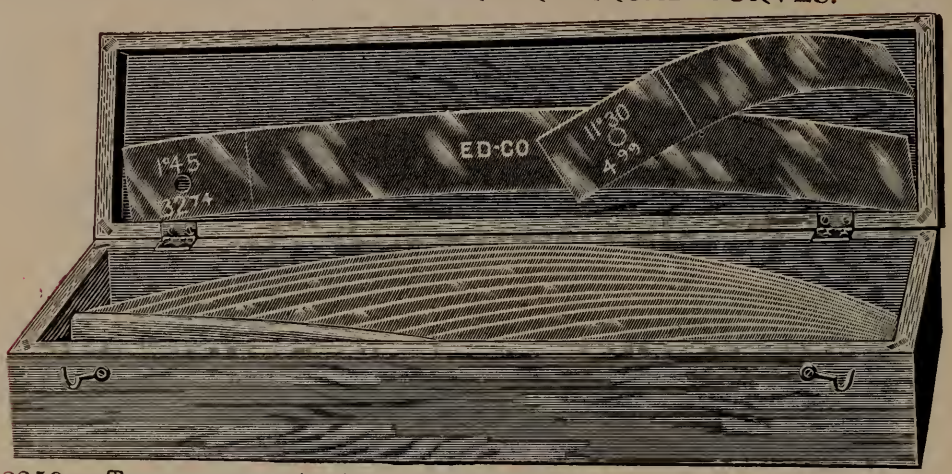
Railroad Curves of any desired scale cut to order.

Single Railroad Curves of Hard Rubber with Tangent, . . . Each, $1 00

RAILROAD CURVES

Continued

TRANSPARENT AMBRO RAILROAD CURVES.



No. 2256.

No. 2250. Transparent Ambro Railroad Curves, 10 in set, 12 to 120 in. radius, viz.: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120 in., in wooden box, ... Per set, $ 9 50

No. 2252. Transparent Ambro Railroad Curves, 17 in set, 12 to 60 in. radius, viz.: 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60 in., in wooden box, ... Per set, 15 00

No. 2254. Transparent Ambro Railroad Curves, 30 in set, $1\frac{1}{2}$ to 60 in. radius, viz.: $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 35, 40, 45, 50, 60 in., in wooden box with partition, ... Per set, 26 00

No. 2256. Transparent Ambro Railroad Curves, **with Tangent,** 41 in set, marked in degrees and inches to 100 feet scale, viz.:

0°.30′=114.59 in.	3°.30′=16.37 in.	6°.00′=9.55 in.	8°.30′=6.75 in.
1°.00′= 57.30 "	3°.45′=15.28 "	6°.15′=9.17 "	8°.45′=6.55 "
1°.15′= 45.84 "	4°.00′=14.33 "	6°.30′=8.82 "	9°.00′=6.37 "
1°.30′= 38.20 "	4°.15′=13.48 "	6°.45′=8.49 "	9°.15′=6.20 "
1°.45′= 32.74 "	4°.30′=12.73 "	7°.00′=8.19 "	9°.30′=6.04 "
2°.00′= 28.65 "	4°.45′=12.07 "	7°.15′=7.91 "	9°.45′=5.88 "
2°.15′= 25.47 "	5°.00′=11.46 "	7°.30′=7.64 "	10°.00′=5.74 "
2°.30′= 22.92 "	5°.15′=10.92 "	7°.45′=7.40 "	10°.30′=5.48 "
2°.45′= 20.84 "	5°.30′=10.42 "	8°.00′=7.17 "	11°.00′=5.22 "
3°.00′= 19.10 "	5°.45′= 9.97 "	8°.15′=6.95 "	11°.30′=4.99 "
3°.15′= 17.63 "	In wooden box with partition,		Per set, $40 00

No. 2258. Transparent Ambro Railroad Curves, **with Tangent,** 55 in set, marked in degrees and inches to 100 feet scale, viz.:

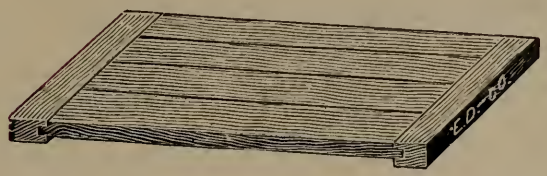
0°.15′=229.18 in.	3°.45′=15.28 in.	7°.15′=7.91 in.	11°.30′=4.99 in.
0°.30′=114.59 "	4°.00′=14.33 "	7°.30′=7.64 "	12°.00′=4.78 "
0°.45′= 76.39 "	4°.15′=13.48 "	7°.45′=7.40 "	12°.30′=4.59 "
1°.00′= 57.30 "	4°.30′=12.73 "	8°.00′=7.17 "	13°.00′=4.42 "
1°.15′= 45.84 "	4°.45′=12.07 "	8°.15′=6.95 "	13°.30′=4.25 "
1°.30′= 38.20 "	5°.00′=11.46 "	8°.30′=6.75 "	14°.00′=4.10 "
1°.45′= 32.74 "	5°.15′=10.92 "	8°.45′=6.55 "	14°.30′=3.96 "
2°.00′= 28.65 "	5°.30′=10.42 "	9°.00′=6.37 "	15°.00′=3.83 "
2°.15′= 25.47 "	5°.45′= 9.97 "	9°.15′=6.20 "	16°.00′=3.59 "
2°.30′= 22.92 "	6°.00′= 9.55 "	9°.30′=6.04 "	17°.00′=3.38 "
2°.45′= 20.84 "	6°.15′= 9.17 "	9°.45′=5.88 "	18°.00′=3.20 "
3°.00′= 19.10 "	6°.30′= 8.82 "	10°.00′=5.74 "	19°.00′=3.03 "
3°.15′= 17.63 "	6°.45′= 8.49 "	10°.30′=5.48 "	20°.00′=2.88 "
3°.30′= 16.37 "	7°.00′= 8.19 "	11°.00′=5.22 "	

In wooden box with partition, ... Per set, $52 00
Single Railroad Curves of Transparent Ambro, ... Each, 1 00
" " " " " " with Tangent, " 1 20

DRAWING BOARDS

Made with care, of selected narrow and thoroughly seasoned strips of Pinewood.

BEST WORKMANSHIP.



No. 2260.

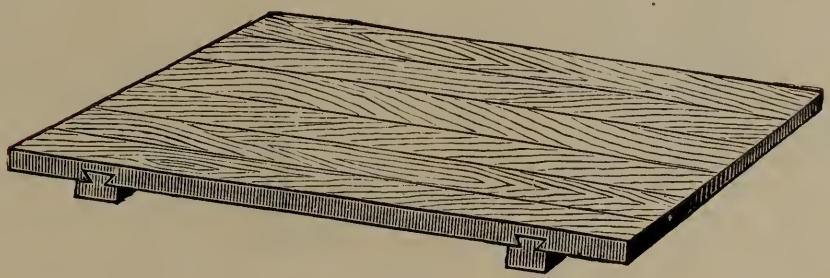
No. 2260. Drawing Board, pinewood, with side ledges clamped.

Size,	12×17	16×22	20×24½	23×31 in.
Each,	$0 65	90	1 15	1 75

No. 2265.

No. 2265. Drawing Board, pinewood, with two drawing surfaces and side ledges.

Size,	12×17	16×22	20×24½	23×31	31×42 in.
Each,	$0 65	90	1 15	1 75	3 25



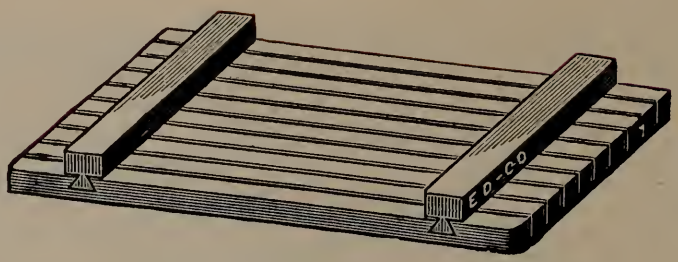
No. 2272.

No. 2272. Drawing Board, pinewood, with hardwood ledges dovetailed into the board to allow contraction and expansion.

Size,	20×24½	23×31	31×42 in.
Each,	$2 00	2 80	4 25

Larger Drawing Boards of any size made to order.

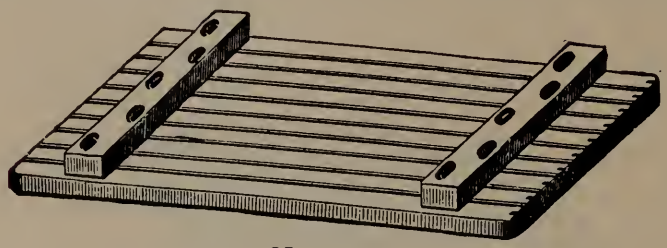
DRAWING BOARDS *Continued*



No. 2273.

No. 2273 Drawing Board, pinewood, with hardwood ledges dovetailed into the board to allow contraction and expansion, and grooves sunk in ¼ the thickness of the board, thus allowing the narrow wooden strips to be still more effectually controlled by the hardwood ledges.

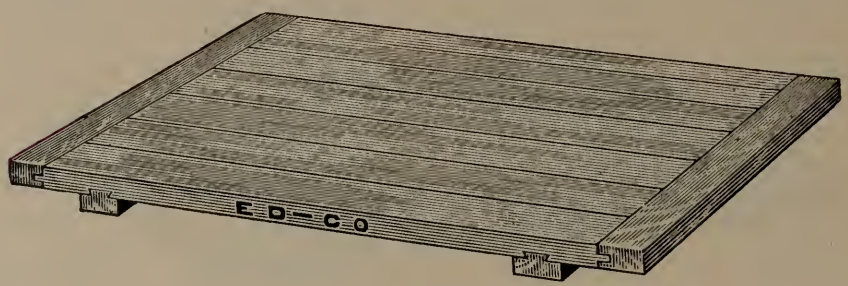
Size,	31×42	36×55	42×60	48×72	48×84 in.
Each,	$5 00	8 00	10 00	14 50	17 50



No. 2275.

No. 2275. Drawing Board, similar to No. 2273, but of **extra fine quality,** with screws passing through the ledges in oblong slots with metal bushings, which allow the screws to move when drawn by the contraction of the board. To make working edge perfectly smooth, a strip of hardwood is let into edge of board, allowing an easy movement of the T-square.

Size,	23×31	31×42	36×55	42×60	48×72	48×84 in.
Each,	$4 00	6 25	9 75	12 00	16 50	20 00



No. 2277.

No. 2277. Drawing Board, of narrow strips of best seasoned pinewood, with hardwood side ledges and dovetailed hardwood ledges underneath, to allow contraction and expansion. These Boards are used on our American Adjustable Drawing Tables Nos. 2309–2319, for which they are especially adapted.

Size,	31×42	36×55	42×60	48×72 in.
Distance between centers of bottom ledges,	26½	38½	50½	50½ in
Each,	$6 00	9 00	11 00	17 00

Larger Drawing Boards of any size made to order.

WOOD WORKING DEPARTMENT—FACTORY

HORSES FOR DRAWING BOARDS

No. 2290.

2291.

		Per pair.
No. 2289.	Wooden Horses, 37 in. high, 35 in. long, light construction,	$3 00
2290.	" " 37 " " 38 " " fine quality, . .	5 00
2291.	" " 37 " " 38 " " with sloping top ledges, fine quality, ...	5 50

No. 2293.

No. 2293. Adjustable Wooden Horses, adjustable for any slope, or can be used level. Height adjustments range from 37 to 47 inches. Length of Horses, 38 inches. Owing to the clamp which connects the fixed and movable parts, great rigidity at any height is assured. Of very solid construction. . Per pair, $7 00

DRAWING STANDS AND TABLES

ECONOMY FOLDING STAND.

No. 2295.

The Economy Folding Stands are of simple but firm construction, with great range of adjustment. The adjustment is from 31 to 41 inches for height and from horizontal to 45 degrees for slant of board. When folded, these Stands occupy but very little space. The Drawing Boards on these Stands are of our regular stock, No. 2272, but having special hardwood ledges.

No. 2295. Economy Folding Stand, with Drawing Board 31×42 in., Each, ... $ 8 00

2296. Economy Folding Stand, with Drawing Board, 36×55 in., Each, ... 10 50

2297. Economy Folding Stand, of Hardwood, with Drawing Board, 31×42 in., Each, ... 10 00

2297½. Economy Folding Stand, of Hardwood, with Drawing Board, 36×55 in., Each, ... 13 00

SHAMROCK ADJUSTABLE DRAWING TABLES

No. 2298A.

The "Shamrock" Drawing Tables are of simple but very substantial construction. The stand is made of hardwood and the Drawing Board of well seasoned pinewood. Height adjustments from 32 to 42 inches are made by spreading or closing the legs, and the adjustment is held by a pin inserted in holes provided in a cam shaped piece. The board may be tilted and rigidly clamped at any angle. Folds up compactly and occupies a comparatively small space when put away. Each Table furnished with drawer, lock and key.

No. 2298A.	Shamrock Drawing Table, board 36×48 in., . .	Each,	$16 00
2298B.	" " " " 42×60 " . .	"	19 00
2298C.	" " " " 48×66 " . .	"	22 00
2298D.	" " " " 48×72 " . .	"	24 00

EUREKA ADJUSTABLE DRAWING TABLES

No. 2299A.

Made in three sizes and of very simple and durable construction. Board stands 40 inches above floor, and by means of simple device shown in illustration, can be tilted and securely clamped at any angle desired.

The box attached to trestle will be found very convenient for holding roll drawing papers, tracing cloth, etc. Each table is also furnished with adjustable tray.

No. 2299A.	Eureka Drawing Table, with Board 31×42 in.,	Each,	$15 00
2299B.	" " " " " 36×55 "	"	19 00
2299C.	" " " " " 42×60 "	"	22 00

For Parallel Rulers for above Tables see Nos. 2102-2104.

UNION FOLDING STAND

No. 2300A.

This Stand is substantially made and nicely finished, with adjustable iron chains to set to convenient height, and hinged top board to set the drawing board slanting.

It is very convenient for offices with limited room, since it can be easily folded up and put against the wall.

No. 2300A.	Union Folding Stand, of hardwood, size, as generally adjusted, 38 in. high, 30 in. long, 27 in. wide, .	Each,	$6 50
2300B.	Large Union Folding Stand, of hardwood, size, as generally adjusted, 39 in. high, 47½ in. long, 35 in. wide,	Each,	8 75
2301A	Union Folding Stand No. 2300A with grooved Drawing Board No. 2273, 31×42 inches, ...	Each,	11 50
2301B.	Union Folding Stand No. 2300A, with grooved Drawing Board No. 2273, 36×55 inches, ...	Each,	14 50
2301C.	Large Union Folding Stand, No. 2300B, with grooved Drawing Board No. 2273, 42×60 inches, . . .	Each,	18 75
2301D.	Large Union Folding Stand No. 2300B, with grooved Drawing Board No. 2273, 48×72 inches, . . .	Each,	23 25

PEERLESS ADJUSTABLE FOLDING STAND

No. 2305A. Peerless Adjustable Folding Stand. Substantially made of hardwood, nicely finished, with stationary drawer, and is easily adjusted to convenient sitting or standing height. The board can be adjusted to any angle, as shown by the illustrations. The stand is 38 inches wide, perfectly rigid and firm in any position, and durable. If folded up it occupies but very little space.

Each, ... $13 50

No. 2305B. Stand No. 2305A, including Drawing Board No. 2265, 31×42 in.

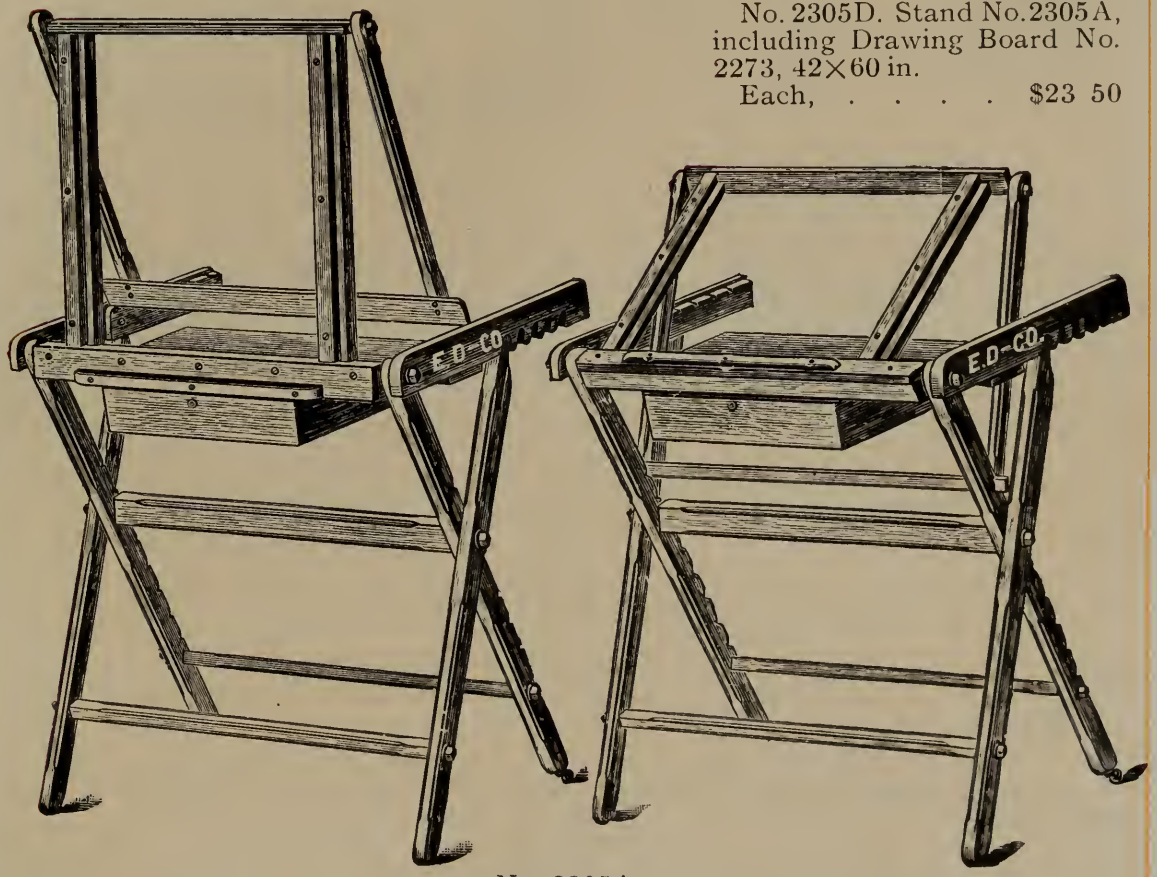
Each, ... $16 75

No. 2305C. Stand No. 2305A, including Drawing Board No. 2273, 36×55 in.

Each, ... $21 50

No. 2305D. Stand No. 2305A, including Drawing Board No. 2273, 42×60 in.

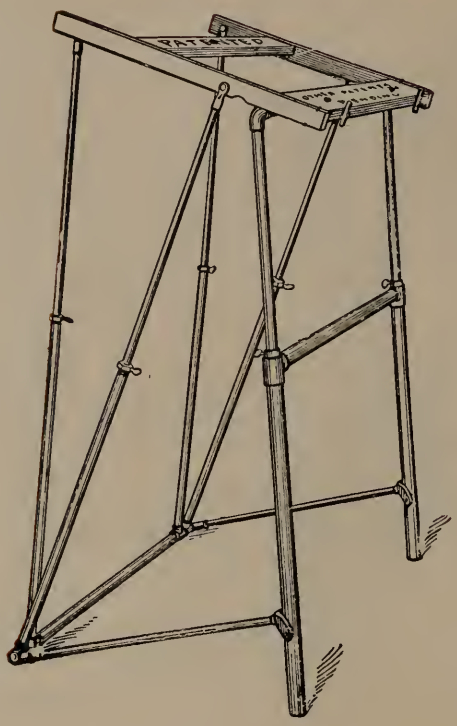
Each, ... $23 50



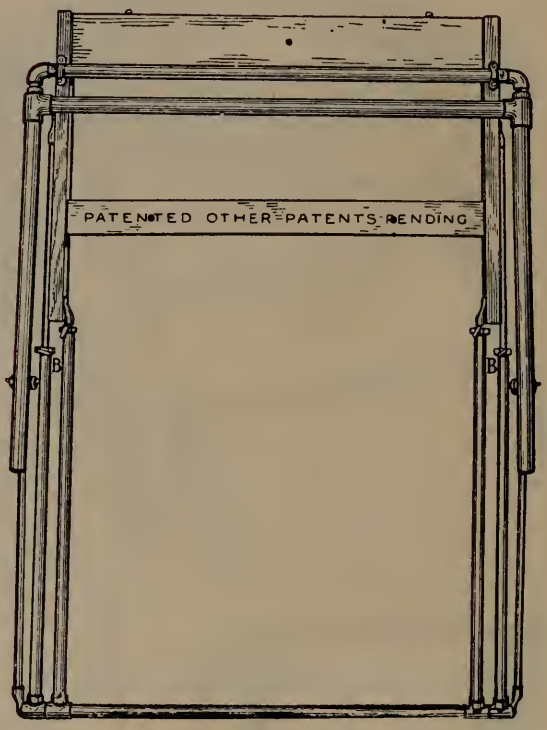
No. 2305A.

Illustrated in three different positions.

AJAX ADJUSTABLE IRON FOLDING STAND



No. 2306-2.



Folded.

The Ajax Folding Stand has many new and unique features which will recommend it for use in Drafting Rooms and Colleges. It is of substantial iron construction, finished in black, with metal tubes which telescope into each other, permitting it to be closed up completely. This feature of great portability permits of it being readily carried to any point desired.

The stand is adjustable for height from 30 to 48 inches, can be tilted to any angle, and also can be instantly leveled on any uneven floor—a very desirable feature.

It can be used as a trestle, the board being held in place by two turn buttons, or the board may be permanently fixed to the wooden top if desired.

		Without Board.
No. 2306–1.	Ajax Folding Stand, top $19\frac{1}{2} \times 20\frac{1}{2}$ in., . . . Each,	$ 7 50
2306–2.	" " " " $21\frac{1}{2} \times 26\frac{1}{2}$ " . . . "	8 50
2306–4.	" " " " $22\frac{1}{2} \times 32\frac{1}{2}$ " extra heavy, "	10 50

Nos. 2306–1 and 2 are for the smaller drawing boards and No. 2306–4 is for boards up to 36×55 in.

Drawing Boards for above Stands listed under Nos. 2260–2277.

EXTRAS.

2306G	Polished nickel-plated stand for Nos. 2306-1,2 extra, Each,	$ 5 00
2306K.	" " " " " 2306-4 " "	10 00

MADISON DRAWING TABLES

No. 2307B. 2307C.

The Madison Drawing Tables were designed to meet all the requirements of an efficient and durable Table for the class room. They are of solid iron construction, with hardwood top, neatly finished, and are so arranged that two students may alternately use one table, being provided with two drawers with locks for storing tools, two hooks for hanging T squares and have a shelf in back for holding the Drawing Boards. They have foot rest and sufficient knee room when the draftsman is sitting on a stool.

The hardwood top is permanently fixed at a convenient slant, but is adjustable to heights of 37, 39 and 41 inches by means of strong bolts which insure perfect rigidity at any height.

No. 2307A.	Madison Drawing Table, hardwood top 25×32 in., two drawers with locks, shelf and one pinewood Drawing Board No. 2265, 23×31 in., ...	Each,	$14 50
No. 2307B.	Madison Drawing Table, like No. 2307A, but without Drawing Board, ...	Each,	12 75
No. 2307C.	Madison Drawing Table, plain, without hardwood top, etc., ...	Each,	9 00

The Plain Table No. 2307C can be utilized to advantage with Drawing Boards from 23×31 in. to 36×48 in. in size.

DRAFTSMEN'S STOOLS

No. 2307F.

2307K.

No. 2307F.	Draftsman's Stool, golden elm, wood seat, height adjustable from 31 to 35 in., ... Each,	$4	50
2307G.	Draftsman's Stool, like No. 2307F, but cane seat, "	4	50
2307K.	" " oak, wood seat, height adjustable from 31 to 35 in., ... Each,	5	25
2307L.	Draftsman's Stool, like No. 2307K, but cane seat, "	5	25

DUSTING BRUSHES

For removing crumbs of rubber etc., from drawings.

No. 2307P.

No. 2307P.	Dusting Brush, invisible wire drawn, 8 in. brush with 6 in. handle, ... Each,	$0	65
2307R.	Dusting Brush, all bristle, set in pitch, 8 in. brush with 6 in. handle, ... Each,		80

COLUMBIA ADJUSTABLE DRAWING TABLES

No. 2308K-R-T.

The Columbia Drawing Tables are made of cast iron, of rigid and durable construction and nicely japanned. The top is raised and lowered by rack and pinion, and can be tilted and clamped at any angle desired. The top consists of our regular pinewood drawing board, No. 2273, having hardwood ledges dovetailed into the board to allow for expansion or contraction.

No. 2308H.	Columbia Drawing Table, with Drawing Board 31×42 in., Each,	$25 00
2308J.	Columbia Drawing Table, with Drawing Board 36×55 in., Each,	28 00
2308K.	Columbia Drawing Table, with Drawing Board 42×60 in., Each,	30 00
2308L.	Columbia Drawing Table, with Drawing Board 48×72 in., Each,	35 00

ACCESSORIES.

No. 2308R.	Folding-Arm with plain shelf, Each,	$2 00
2308S.	" " " large " and drawer with lock, "	4 00
2308T.	Bracket with cabinet having two drawers with locks, "	5 00

AMERICAN ADJUSTABLE DRAWING TABLES

Patented
October 28, 1890.

Nos. 2309–2318.

The Tables Nos. 2309 to 2318 excel other drawing tables in the following essential points, viz.:

1. *Ease of adjustment of Board to any angle* from vertical to horizontal position, *and of stand to any suitable height* for sitting or standing posture. After the clamp is loosened, only a slight pressure on the handle is required to either raise or lower the table, because all weight is counterbalanced by the spiral spring shown in the cut. The handle and both clamps (that of board and that of stand) are operated on one and the same side.

2. *Perfect rigidity and firmness in any position* after the clamps are tightened, and the latter is easily done with one hand so effectually that a stout man could safely walk on the edge of the board without tipping the board.

3. *Neatness of appearance and quality of workmanship and material.* The stand is nicely painted with black Japan, and of substantial iron construction. The Drawing Boards on stands Nos. 2309–2318 are first-class in every respect, finished with shellac and made out of narrow strips of best seasoned pine, with dovetailed hardwood ledges underneath and hardwood side ledges.

4. *The prices are the most reasonable, and considerably below those of any other adjustable tables.*

Comfort, health and saving of time and labor in drafting are the advantages chiefly considered and achieved in the construction of above American Adjustable Drawing Tables. These tables can be used sitting or standing, and obviate all tiring and unhealthy work in a strained or stooping position.

5. *They occupy but little space* if board is adjusted to a vertical position and placed against the wall.

Above adjustable stands without boards, see Nos. 2315-2317 on next page.

AMERICAN ADJUSTABLE DRAWING TABLES *Continued*

Patented Oct. 28, 1890.

No. 2310.

Find description on preceding page.

No. 2309.	American Adjustable Drawing Table, stand No. 2315, with superior quality board, No. 2277, 31×42 in., . .	Each,	$30 00
2310.	American Adjustable Drawing Table, stand No. 2316, with superior quality board, No. 2277, 36×55 in., . .	"	37 00
2311.	American Adjustable Drawing Table, stand No. 2317, with superior quality board, No. 2277, 42×60 in., . .	"	41 00
2313.	American Adjustable Drawing Table, stand No. 2317, with superior quality board, No. 2277, 48×72 in., . .	"	47 00
2315.	American Adjustable Drawing Stand, *without board*, distance between centers of brackets 26½ in., ...	"	24 00
2316.	American Adjustable Drawing Stand, *without board*, distance between centers of brackets 38½ in., ...	"	28 00
2317.	American Adjustable Drawing Stand, *without board*, distance between centers of brackets 50½ in., ...	"	30 00

AMERICAN ADJUSTABLE DRAWING TABLES *Continued*

Patented Oct. 28, 1890.

No. 2318.

Find further description on page 260.

No. 2318. American Adjustable Drawing Table, with board 42×60 inches and stand No. 2317, having a perfectly reliable Mahogany Ebony Lined Parallel Ruler, which remains stationary in any given horizontal position, thus serving as T-Square. The nickel plated mountings, wheels, etc., for the Parallel Ruler, are made with great care, very accurately, affording exact parallel motion. The system we employ for accurate parallel motion has been successfully used for some years past in many drafting offices in this country and in Europe; it allows the draftsman the free use of both hands, and thus greatly facilitates quick and accurate drafting, ... Each, $54 00

2319. Drawing Board, 42×60 inches, with Mahogany Ebony Lined Parallel Ruler, without stand, ... Each, 24 00

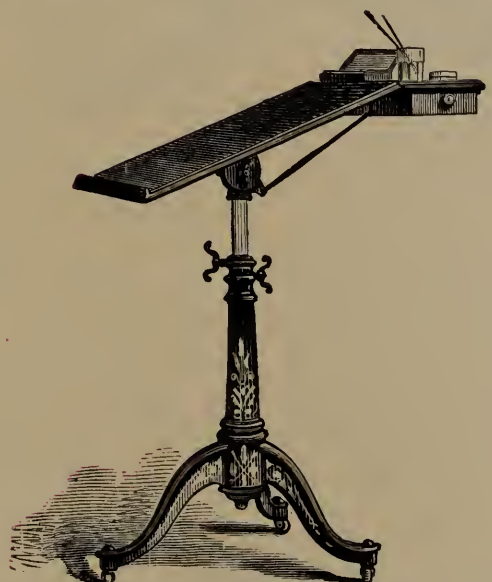
STANDARD DRAWING TABLES

These Tables can be fixed at any *required height*, so one can use them either sitting or standing; and by turning back the screw at the right, it is allowed to rotate, bringing *either side in front.* The shelf or ledge for instruments is attached to the reverse side of the table, so that it is *always level*, whatever inclination is given to the desk. This is very convenient for the water-cups, inkstands, etc. When the table is nearly vertical the whole occupies but little space, and forms a perfect easel.

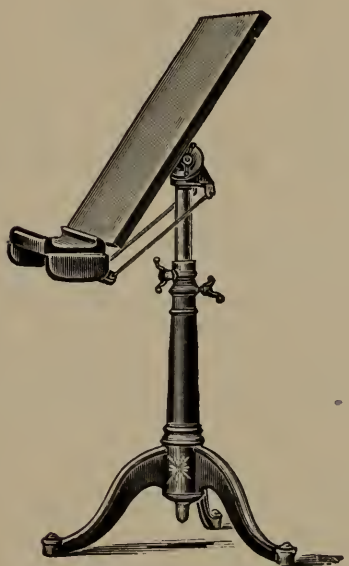
Cast iron is used for the tripod, hollow standard and sliding spindle, which are neatly painted and bronzed. The working parts are well finished and very easily operated. The stand is sufficiently firm to hold a large drawing board. They can be raised to a level of 44 inches and lowered to 30 inches.

No. 2320. . . $8 75

No. 2321. . . $10 00



No. 2323. . . $13 25

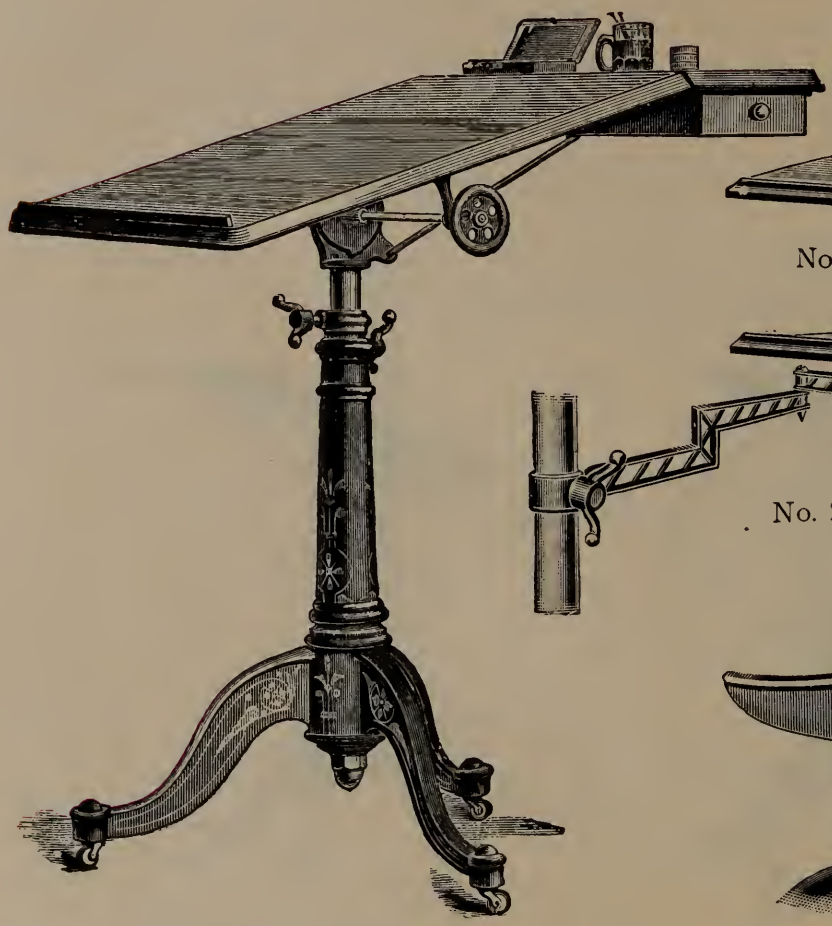


No. 2327. . . $11 00

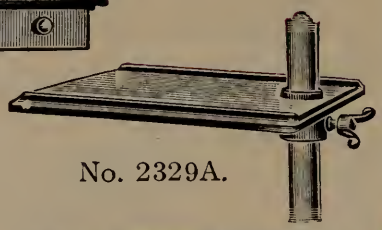
STANDARD DRAWING TABLES

Continued

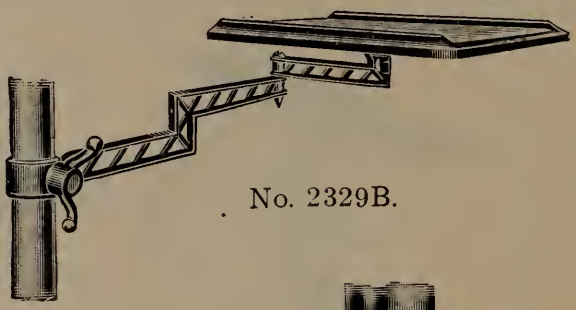
For Office, Library or Sitting Room.



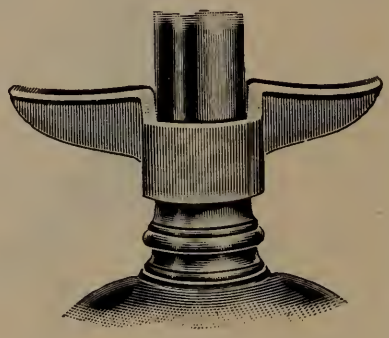
No. 2324.



No. 2329A.



No. 2329B.



No. 2329C.

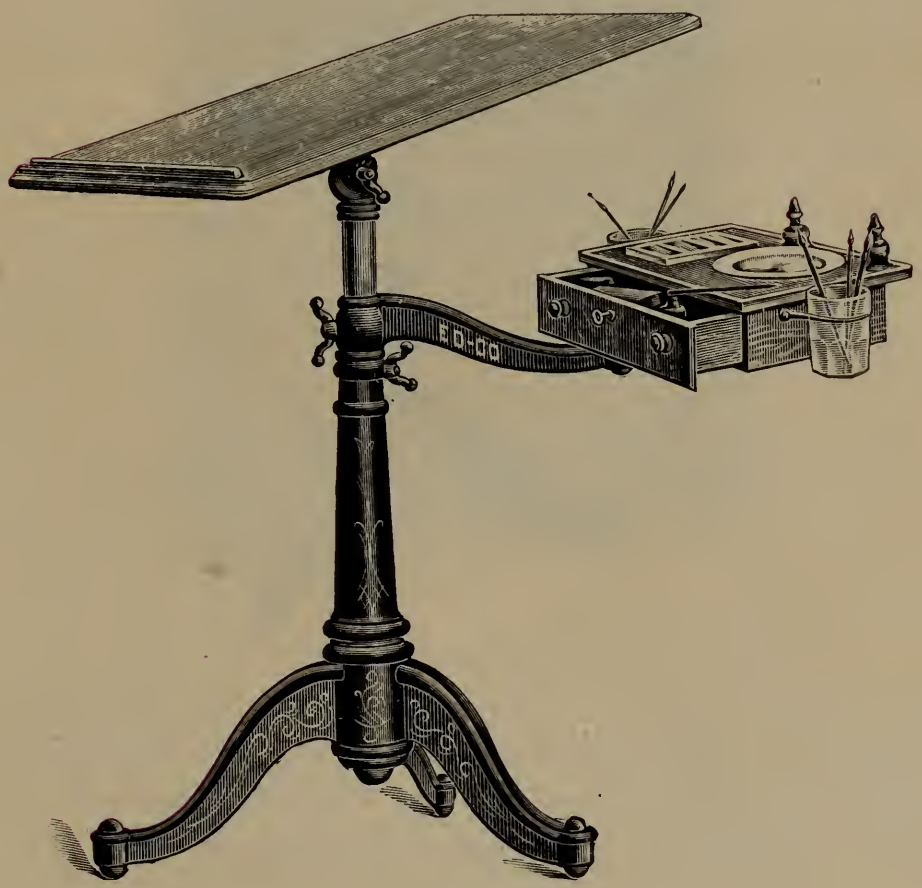
No. 2320.	Ash Top, 22×24 in.,	Each,	$ 8 75
2321.	" " 22×24 " with top shelf,	"	10 00
2322.	Quar. Oak Top, 22×26 " " " "	"	11 00
2323.	" " " 22×26 " top shelf with two drawers, on casters,	"	13 25
2323½.	Mahogany Top, otherwise same as No. 2323,	"	14 00
2324.	Quartered Oak Top, 22×26 in., top shelf with two drawers, and long set screw, on casters,	"	14 50
2324½.	Mahogany Top, otherwise same as No. 2324,	"	15 50
2327.	Clay Modeling Stand, Ash Top, 22×24 in., with cups,	"	11 00

ACCESSORIES

2329A.	Adjustable Shelf, plain,	Each,	$ 1 25
2329B.	Swinging Arm with Shelf,	"	1 75
2329C.	Foot Rest,	"	65
2329D.	Casters, to fit any of above Tables,	Per set,	30

STANDARD DRAWING TABLES *Continued*

SPECIALLY ADAPTED FOR WATER-COLOR PAINTING



No. 2330.

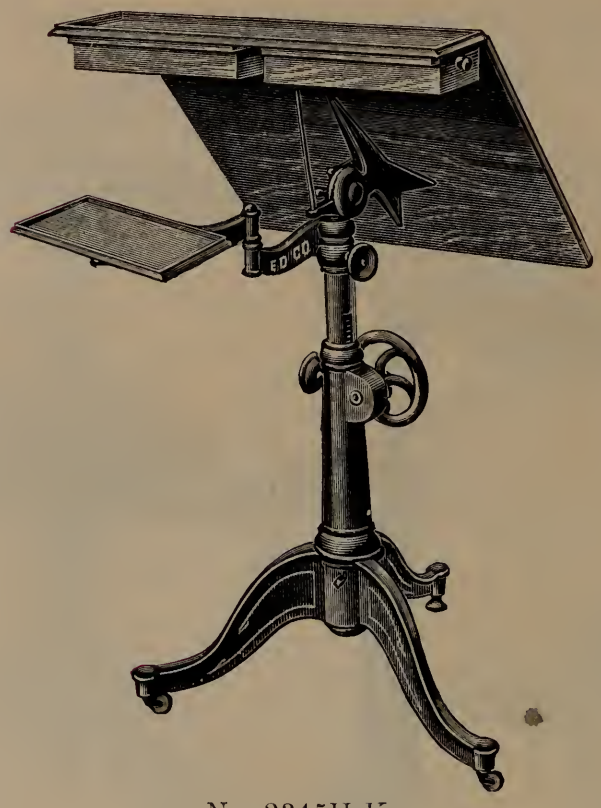
No. 2330. Standard Drawing Table, Ash Top, 22 × 24 in., swinging-arm with large shelf, drawer with lock, and two holders for water-glasses, ... Each, $13 50

2332. Standard Drawing Table, Oak Top, 22×26 in., swinging-arm with shelf, drawer with lock, and two holders for water-glasses, ... Each, 14 50

No extra charge for crating these Tables for shipment.

MATCHLESS DRAWING TABLES

With Rack and Pinion Movement.



No. 2345H-K.

These Tables are made of cast iron, with the exception of the top, of rigid and durable construction, and nicely finished. The top is easily raised and lowered by rack and pinion and can be tilted to any required angle.

No. 2345A.	Matchless Drawing Table, Ash Top, 22×24 in., plain, Each, ...	$11 50
2345B.	Matchless Drawing Table, Ash Top, 22×24 in., with shelf, Each, ...	13 00
2345F.	Matchless Drawing Table, Oak Top, 22×26 in., plain, Each, ...	12 00
2345G.	Matchless Drawing Table, Oak Top, 22×26 in., with shelf, Each, ...	13 50
2345H.	Matchless Drawing Table, Oak Top, 22×26 in., with shelf and two drawers, ... Each,	15 00

ACCESSORIES.

No. 2345K.	Folding-Arm, with plain shelf, ... Each,	$1 50
2345L.	" " " large " and drawer with lock (as shown in illustration No. 2330), ... Each,	4 00

SECTIONAL FILING CASES

For Filing Drawings Flat.

SHOWING THREE SECTIONS, DRAWER BASE AND TOP.

Our Cabinets will be found uniform in size, and always the same, so that any number of sections procured at different times will fit perfectly.

Each section is composed of five drawers 2 inches deep, 42½ inches long and 32 inches wide, inside measure. The sections are 14½ inches high over all.

The top and base make a neat finish. The bases are made in two styles, one a plain moulded base 3½ inches high, the other containing a drawer 5¼ inches deep and 42½ inches long by 32 inches wide, inside measurement. The top fits any section, is closed at the top, made in one style, and corresponds to either base. Height of top, 3½ inches.

Construction and Material.—The sections, cap and base are made from well seasoned oak. The drawers slide in grooves, there being no rails between them.

The back of each drawer is covered for a space of 6 inches with a thin strip to prevent drawings curling up. Top, base and sections are the same width over all, so that another stack may be built up without leaving an opening. All joints are well glued, and glue blocks are used at frequent intervals to make the cases firm and durable.

Finish and Trimmings.—Golden oak stain and filler; three coats of varnish, rubbed; bronze drawer pulls and label holders.

No. 2348A.	Regular section of five drawers,	Each,	$20 00
2348B.	Top,	"	6 00
2348C.	Base, plain,	"	4 50
2348D.	Base, with drawer 5¼ inches deep,	"	8 00

Other Styles or Sizes made to order.

COMBINATION FILING CABINETS

No. 2349A.

This Combination Filing Cabinet is made of well seasoned oak, golden oak rubbed finish, and is composed of two filing sections, each containing 5 drawers, the inside measurements of which are $32 \times 42\frac{1}{2} \times 2$ inches; a base cut out to a sufficient height so as to give foot space, to stand up close, and a swinging arm with tray and drawer. The top is a fine pinewood Drawing Board, so arranged that it can be pulled forward to project about four inches beyond the front edge of the cabinet, can be raised and lowered from 35 to 43 inches on the level, and can be tilted to any angle. The parts are securely fastened together, making a very rigid outfit.

No. 2349A.	Combination Filing Cabinet, **adjustable top**, 37×50 in., Each,		$57 50
2349B.	" " " " "	37×60 " "	61 00
2349C.	" " " " "	40×72 " "	65 00
2349F.	" " " **flat top,**	37×50 in., "	49 00
2349G.	" " " " "	37×60 " "	52 00
2349H.	" " " " "	40×72 " "	56 00

Nos. 2349F-2349H have a flat Drawing Board top, as shown in illustration below.

No. 2350A.

This Combination Cabinet consists of one filing section containing 5 drawers, each $32 \times 42\frac{1}{2} \times 2$ inches inside measure, with flat pinewood Drawing Board top which is put on with slides so it can be drawn forward, and a swinging arm with tray and drawer. Is $37\frac{1}{2}$ inches in height, made of well seasoned oak, golden oak rubbed finish, making a very neat, durable and practical outfit.

No. 2350A.	Combination Filing Cabinet, flat top,	37×50 in., Each,	$32 00
2350B.	" " " " "	37×60 " "	35 00
2350C.	" " " " "	40×72 " "	39 00

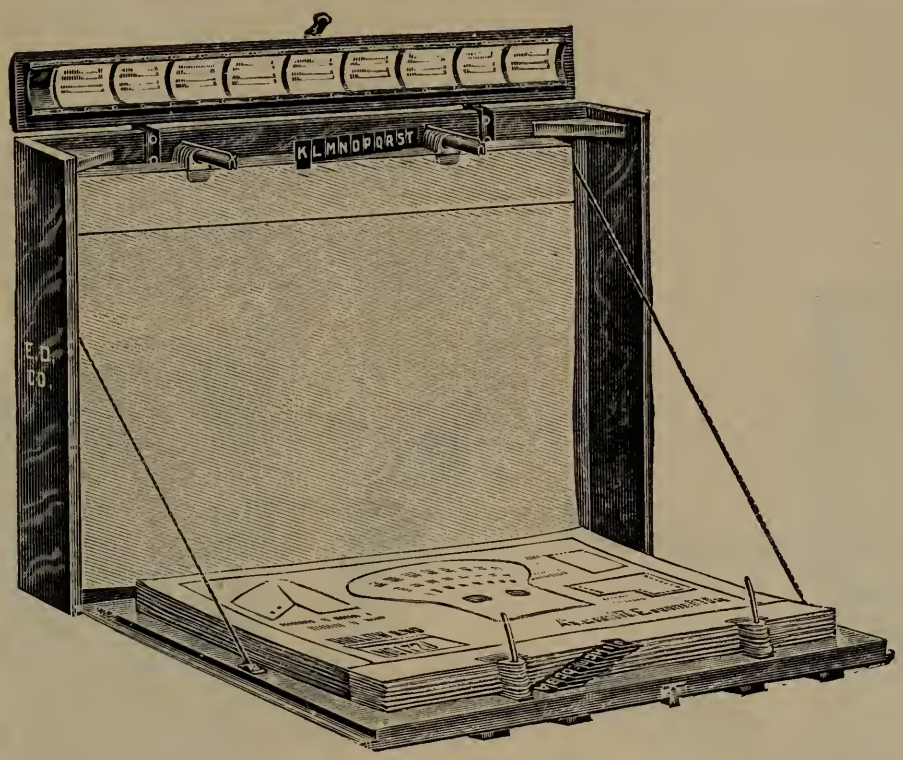
THE "BECK" VERTICAL FILING CASES

For Drawings, Tracings, Blue Prints, Maps, Charts and Specifications.

The "Beck" Vertical Filing Case is a radical change from any method of filing and indexing heretofore used. It has features combining the best modern methods of recording and indexing with a common sense filing case by which any drawings may be extracted without disturbing the order of the balance, or they may be exposed for examination instantly without changing their position in the file.

Space, convenience, time saving, and the preservation of drawings taken into consideration, the "Beck" Vertical Filing Case is the cheapest and best system for filing drawings, tracings, blue prints, etc., upon the market.

Patented in United States, Great Britain, Canada and Germany.



No. 2355B. Style "A", open, with drawings exposed for inspection.

The "Beck" Vertical Filing Case consists of a vertical case 4 inches deep inside, having a hinged top and a drop front to form a desk, upon which the drawings are exposed for inspection. Near the top of the case are a pair of hollow steel sleeves, from which the file sheets or envelopes are suspended by means of steel rings secured to their edges. In the top are brass grooves for the reception of a series of cards for a classified index of the contents of the case.

The regular outfits include 20 file sheets or 20 envelopes, as ordered, each bearing an index tab as shown in illustration. The file sheets are made of best manilla tag board and have a series of stub leaves at the top, to which the drawings are secured by ordinary brass paper fasteners. The envelopes are of best manilla tag board, bound at the edges with cloth, and are so constructed that the tracings, drawings, etc., are held in a vertical position and require no fastening whatever.

We strongly recommend the use of envelopes where the tracings or data to be filed are frequently taken from the case for reference, or to have reproductions made.

"BECK" VERTICAL FILING CASES *Continued*

The capacity of Style "A" Wall case is 400 sheets of tracings. All files are the same depth, 4 in. inside, and 6¼ in. over all, outside. In width and height they are 5 in. larger than the drawing to be filed. A 24x36 in. file is 29 in. high and 41 in. wide outside. The case should be well secured to the wall at a suitable height to form a desk when the drop front is down, generally about 28 in. from the floor.

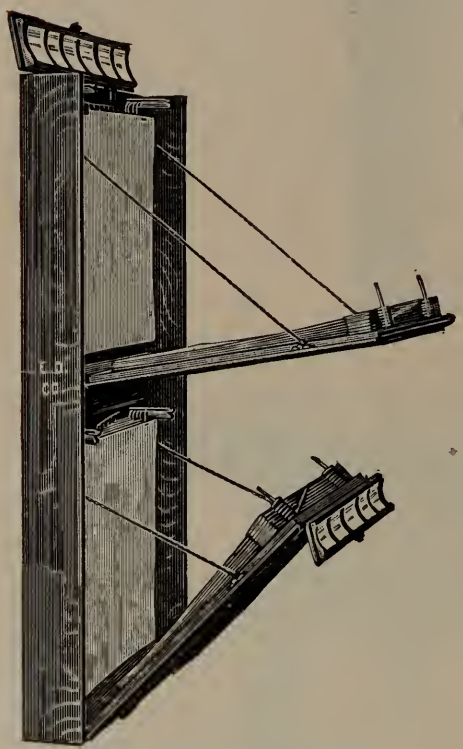
Made in three grades as follows:

GRADE 1—Quarter-Sawed Oak, finished in Golden Oak, Antique or Natural as desired.
GRADE 2—Plain Oak, finished either dark or light, as desired.
GRADE 3—Black Ash, dark finish.
Cases of Mahogany, Birch or any other size or finish made to order.

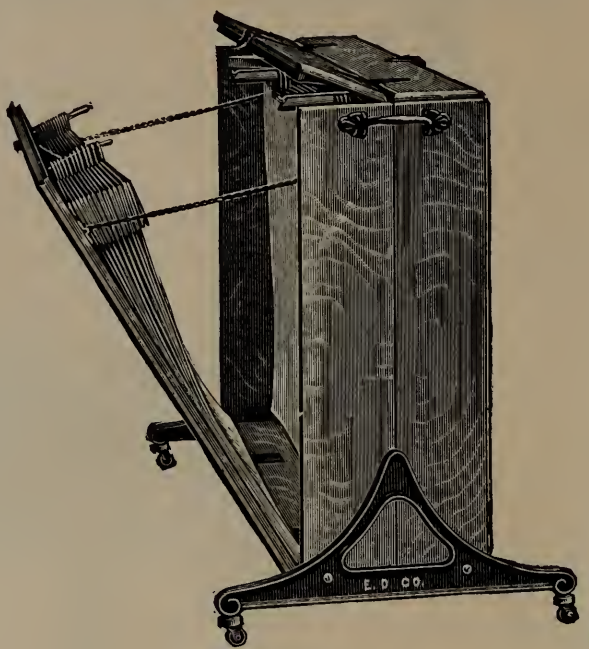
		For Drawings		Each Grade 1	Each Grade 2	Each Grade 3
No. 2355A.	Style "A"	22×30 in.,	with 20 file sheets,	$20 00	$18 75	$18 00
2355AX.	"	22×30 "	" 20 envelopes,	24 40	23 15	22 40
2355B.	"	24×36 "	" 20 file sheets,	21 00	19 75	18 75
2355BX.	"	24×36 "	" 20 envelopes,	25 40	24 15	23 15
2355C.	"	30×42 "	" 20 file sheets,	23 50	21 75	20 75
2355CX.	"	30×42 "	" 20 envelopes,	29 50	27 75	26 75
2355D.	"	36×42 "	" 20 file sheets,	24 25	23 00	21 50
2355DX.	"	36×42 "	" 20 envelopes,	30 25	29 00	27 50
2355E.	"	36×48 "	" 20 file sheets,	27 75	25 75	24 25
2355EX.	"	36×48 "	" 20 envelopes,	33 75	31 75	30 25

In ordering, specify **grade** and **finish** desired.

Our 24 page pamphlet containing full description and price list of the various styles of Beck Files sent to any address on request.



No. 2357A. Style "B"



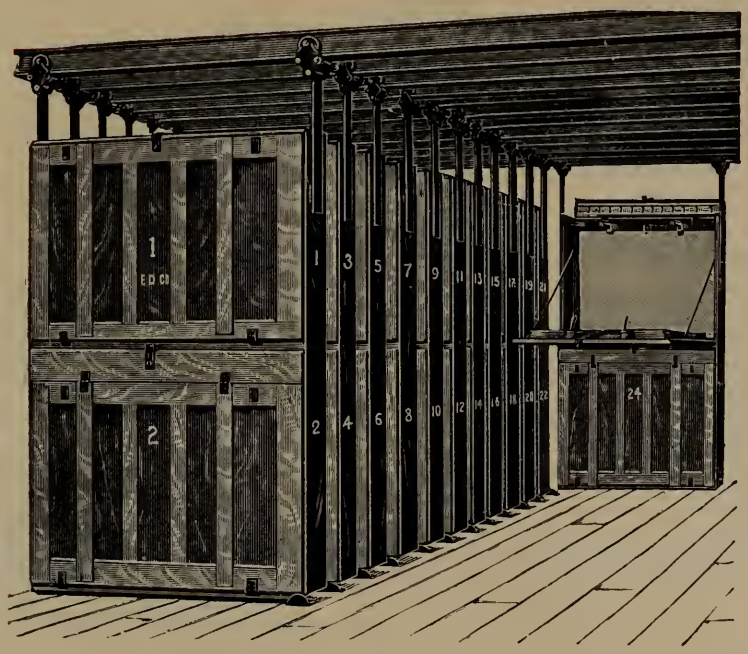
No. 2358A. Style "E"

		For Drawings		Each Grade 1	Each Grade 2	Each Grade 3
No. 2357A.	Style "B"	22×30 in.,	with 40 file sheets,	$34 00	$32 00	$30 00
2357AX.	"	22×30 "	" 40 envelopes,	42 80	40 80	38 80
2357B.	"	24×36 "	" 40 file sheets,	36 00	34 00	32 00
2357BX.	"	24×36 "	" 40 envelopes,	44 80	42 80	40 80
2358A.	Style "E"	22×30 "	" 40 file sheets,	36 50	34 00	32 00
2358AX.	"	22×30 "	" 40 envelopes,	45 30	42 80	40 80
2358B.	"	24×36 "	" 40 file sheets,	39 00	36 00	34 00
2358BX.	"	24×36 "	" 40 envelopes,	47 80	44 80	42 80

In ordering, specify **grade** and **finish** desired.

"BECK" VERTICAL FILING CASES *Continued*

For Vaults and Filing Rooms.



This illustration shows 12 units of Style "B", 24x36 in., installed in a vault or file room, rolling on suspended tracks. **Capacity,** 10,000 tracings, attached to file sheets. **Floor space required,** 7 ft. 2 in. x 7 ft. 6 in.

By this arrangement any drawing may be readily located and examined with case no matter how old.

If interested, send us the size of your vault or filing room, with the number and size of drawings or tracings to be filed and we will be pleased to submit plans and estimates.

Illustration suggesting an entry in the ledger or card index, using the three character system. The index characters on the file sheets and on each drawing, will indicate to what file case the different sheets belong, so that a drawing may be returned to its proper place without stopping to consult the ledger or card index.

No. OF FILE CASE	NAME			RESIDENCE
10	Brown, J.H.			Brick
DATE		FILE CASE	FILE SHEET	REMARKS
	Plans & Elevations	10	G	15 Sheets 1–15
	Details, Exterior	10	H	20 Sheets 1–20
	Details, Interior	10	I	18 Sheets 1–18

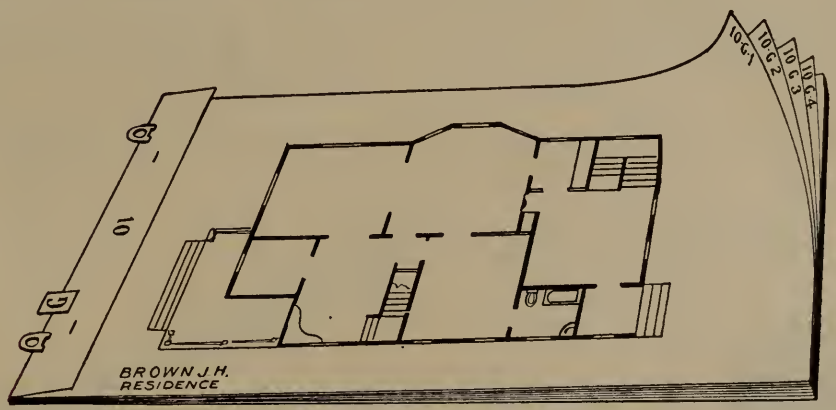
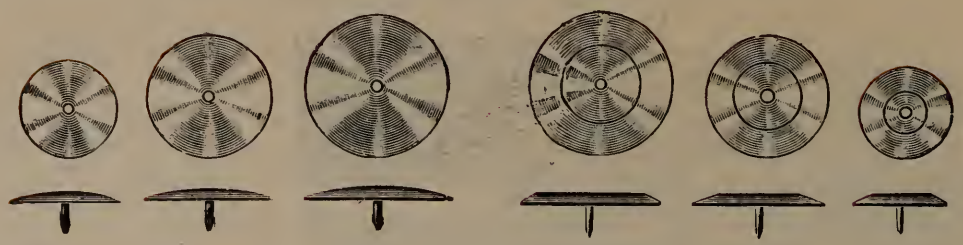


Illustration showing the file sheet with drawings corresponding to the entry 10-G shown above.

LEATHER INDEX TABS, for filing drawings alphabetically, with opening at one end for inserting cards, put on file sheets or envelopes, Per set of 20, ... $2 50

Our 24 page pamphlet containing full description and price list of the various styles of Beck Files sent to any address on request.

GEM UNION THUMB TACKS



No. 2362. 2364 2366. 2376. 2374. 2372.

Gem Union Thumb Tacks, Nos. 2362–2376, are made by hand, with great care. They have best hardened steel pins judiciously proportioned in thickness and length so as not to bend, which are screwed and riveted into German Silver heads, with fine, thin edges, offering no obstruction to T-square or Triangle to slide over.

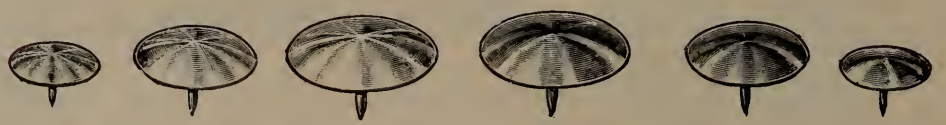
Packed one dozen on a card.

No. 2362.	German Silver, Round Heads, $\frac{3}{8}$ in. diameter, . Per doz.,	$0 50
2364.	" " " " $\frac{1}{2}$ " " "	65
2366.	" " " " $\frac{5}{8}$ " " "	80
2372.	German Silver, Beveled Heads, $\frac{3}{8}$ " " "	50
2374.	" " " " $\frac{1}{2}$ " " "	65
2376.	" " " " $\frac{5}{8}$ " " "	80

SOLID STEEL TACKS.

No. 2389.	Solid Blue Steel, Round Heads, $\frac{5}{16}$ in. diam., very fine, Per doz.,	$0 80
2390.	" " " " " $\frac{1}{2}$ " " " " " "	1 00

THUMB TACKS WITH RIVETED STEEL POINTS



No. 2401. 2403. 2405. 2426. 2424. 2422.

Thumb Tacks Nos. 2401–2426 are inferior in quality to the above Gem Union Tacks and pins are not screwed in, but prevented from pushing through.

Packed one dozen on a card.

		Per gross.	Per doz.
No. 2401.	German Silver, Round Heads, $\frac{3}{8}$ in. diameter, .	$2 00	$0 20
2403.	" " " " $\frac{1}{2}$ " " . . .	2 50	25
2405.	" " " " $\frac{5}{8}$ " " . . .	3 50	35
2422.	Brass, Round Heads, $\frac{3}{8}$ in. diameter, ...	1 50	15
2424.	" " " $\frac{1}{2}$ " "	2 00	20
2426.	" " " $\frac{5}{8}$ " "	3 00	30

No. 2430.

BRASS THUMB TACKS IN TIN BOXES.

No. 2430. Brass, Round Heads, $\frac{3}{8}$ in. diameter, one dozen in tin box, Per box, ... $0 10

SIMPLEX BRASS THUMB TACKS

In Boxes of one gross only.

No. 2434. 2435. 2436.

No. 2434. Brass, Round Heads, $\frac{3}{8}$ in. diam., Per box of one gross, . . $1 00
2435. " " " $\frac{1}{2}$ " " " " " " . . 1 30
2436. " " " $\frac{5}{8}$ " " " " " " . . 1 60

STEEL STAMPED THUMB TACKS

No. 2440. 2441. 2442.

Our Steel Stamped Thumb Tacks are made of one piece of hard steel and are of the best quality. They have needle-finished points, and make an excellent substitute for the regular thumb tack when a lower-priced article is desired.

No. 2440. Round Heads, $\frac{5}{16}$ in. diam., Per box of 100, $0 45; Per doz., $0 08
2441. " " $\frac{3}{8}$ " " " " " 55; " 10
2442. " " $\frac{1}{2}$ " " " " " 70; " 12

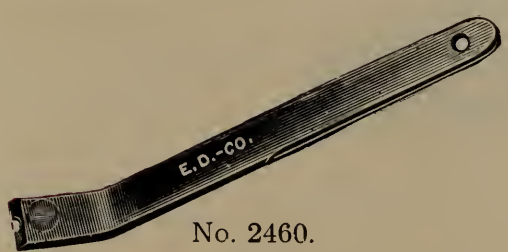
SOLID STEEL HEAD THUMB TACKS

No. 2445. 2446. 2447.

The Steel Head Thumb Tacks have a very thin and strong steel head, so constructed as to prevent the pin from pulling out or pushing through. They are of neat appearance and very durable.

No. 2445. Round Heads, $\frac{5}{16}$ in. diam., Per box of 100, $0 80; Per doz., $0 12
2446. " " $\frac{3}{8}$ " " " " " 1 00; " 15
2447. " " $\frac{1}{2}$ " " " " " 1 20; " 18

TACK LIFTER



No. 2460.

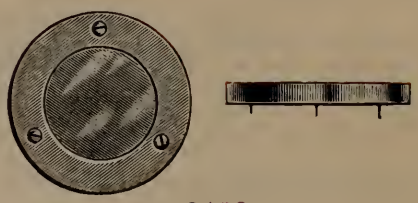
Made of metal and plated. Is convenient for pushing in as well as extracting tacks from the drawing board, without injury to the points. The handle can be used as a paper cutter, and is serviceable for pressing down the edges in stretching paper, and removing sheets which have been gummed to the board.

No. 2460. Tack Lifter, nickel plated, ... Each, $0 25

See also No. 3418, File and Tack Lifter.

HORN CENTERS

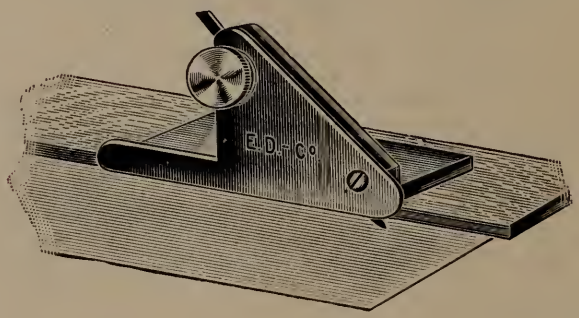
No. 2465.



2466.

No. 2465. Horn Center, plain, ½ in. diameter, ... Each, $0 10
2466. " " with German silver rim, ¾ in. diameter, " 50

PAPER CUTTERS



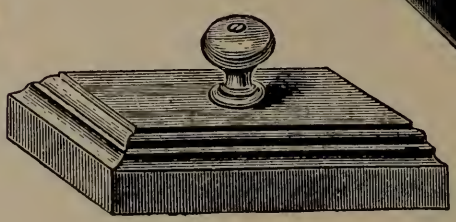
No. 2470.

No. 2470. Paper Cutter, brass, ... Each, $0 50
2471. " " nickel plated, ... " 65

These instruments are used for cutting drawings from the board, also for cutting any kind of paper or bristol board. They can be slid along T-square or straight edge without injuring its edge, and have a thumb-screw adjustment which may be set so as to cut only the thickness of the paper, without marking the drawing board.

PAPER WEIGHTS

No. 2480.



No. 2482.

No. 2484.

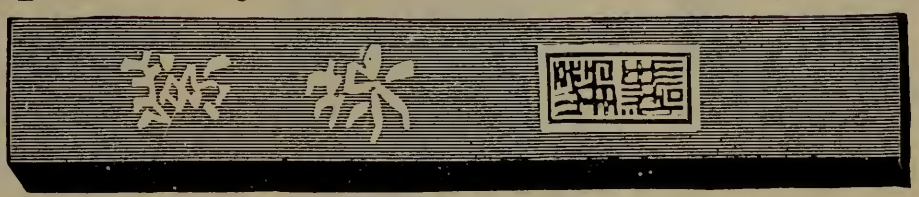
No. 2480. Iron Paper Weight, round, with opening in center to hold ink bottle; weight, about 2 lbs., ... Each, $0 40
2482. Iron Paper Weight, square, with knob, large size, . " 75
2484. Lead " " covered with leather, about 4×2¼×¾ in.; weight about 2¾ lbs., ... " 80

CHINESE OR INDIAN INKS

Our Own Direct Importation.

Illustrations full size.

B C E G K



L

No. 2600 Chinese or Indian Inks.

B.	First quality Lion Head, medium, $2\frac{3}{8}$ in. long, thick,	Each,	$0 15
C.	" " " " large, $3\frac{1}{4}$ " " " "		25
E.	Square, black, gilt figures, $2\frac{1}{8}$ in. long, ...	"	25
G.	" " " " $2\frac{3}{4}$ " " thick, . . .	"	60
K.	" " super super, small, $2\frac{7}{8}$ in. long, thick,	"	30
L.	" " " " large, $3\frac{5}{8}$ " " " "		60

The most practical slabs for rubbing up above Inks uniformly and quickly are our improved Slate Ink Slabs, Nos. 3000-3001, with air-tight plate glass cover.

CHINESE OR INDIAN INKS

Continued

Our Own Direct Importation.

Illustrations full size.

PX

R

No. 2652.

No. 2600.	Chinese or Indian Inks.		
	PX. Oblong, gilt, $3\frac{5}{8}$ in. long, extra fine quality, .	Each,	$2 70
	R. " black, $3\frac{3}{4}$ " " " " " " . .	"	4 50
2650.	Red Chinese Inks, $2\frac{3}{4}$ " "	"	30
2652.	Blue " " $2\frac{3}{4}$ " "	"	30

The most practical slabs for rubbing up above Inks uniformly and quickly are our improved Slate Ink Slabs, Nos. 3000-3001, with air-tight plate glass cover.

JAPANESE INKS

Waterproof. Our Own Direct Importation.

Illustrations full size.

1

2

4

Patterns do not always agree with illustrations as they are constantly changed.

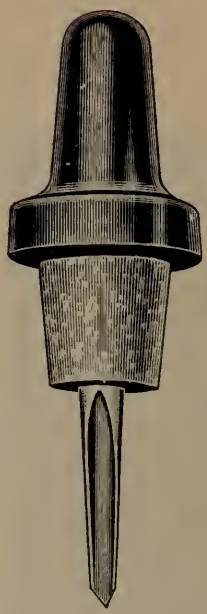
No. 2660. Japanese Inks.

1.	Oblong Black,	Each,	$0 90
2.	" "	"	1 20
4.	" " extra fine,	"	2 00

Japanese Inks are harder than Chinese Inks, and will stand washing.

The most practical slabs for rubbing up above Inks uniformly and quickly are our improved Slate Ink Slabs, Nos. 3000-3001, with air-tight plate glass cover.

DIETZGEN'S
LIQUID WATERPROOF DRAWING INKS



Our Improved Liquid Waterproof Drawing Inks are made by new processes and formula, the result of a long series of careful scientific experiments. They have stood the most rigid and extended tests and will be found to possess all the desirable features required in a reliable ink for general drafting. They are extremely smooth flowing, contain no chemicals injurious to instruments or drawings, and are kept accurately at a fixed standard of density and quality.

The WATERPROOF BLACK INK is made from the highest grade of pure carbon, of unsurpassed density, flows freely from the pen and even the finest lines produced by it are absolutely opaque. It is perfectly waterproof when dry, so that color washes can be used safely over it.

The COLORED INKS are exceedingly dense, true and brilliant. They can be used for lines or washes, are waterproof when dry and may be thinned with distilled water or mixed with each other to produce other shades.

				1 oz.	4 oz.	½ Pt.	Pt.	Qt.
No. 2701.	Dietzgen's Waterproof	Black	Ink,	$0 25	90	1 60	3 00	5 75
2702.	"	"	Yellow	"	25	90	1 60	3 00	5 75
2703.	"	"	Orange	"	25	90	1 60	3 00	5 75
2704.	"	"	Scarlet	"	25	90	1 60	3 00	5 75
2705.	"	"	Carmine	"	25	90	1 60	3 00	5 75
2706.	"	"	Blue	"	25	90	1 60	3 00	5 75
2707.	"	"	Green	"	25	90	1 60	3 00	5 75
2708.	"	"	Brown	"	25	90	1 60	3 00	5 75
2709.	"	"	Brick Red	"	25	90	1 60	3 00	5 75
2710.	"	"	Vermilion	"	25	90	1 60	3 00	5 75

DIETZGEN'S PHOTO BLACK DRAWING INK

No. 2712.

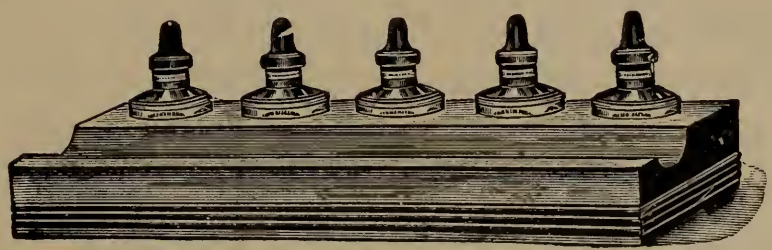
Our Photo Black Drawing Ink is soluble and best adapted for fine line drawings, patent office drawings and tints and washes.

		1 oz.	4 oz.	½Pt.	Pt.	Qt.
No. 2712.	Dietzgen's Photo Black Ink, Each,	$0 25	90	1 60	3 00	5 75

DIETZGEN'S MULTI-COLOR OR HEKTOGRAPH INKS

No. 2715-1.	Hektograph Ink, Black, ...	Per 1 ounce bottle,	$0 50
2715-2.	" " Blue, ...	" 1 " "	15
2715-3.	" " Brown, . . .	" 1 " "	15
2715-4.	" " Green, ...	" 1 " "	15
2715-5.	" " Purple, ...	" 1 " "	15
2715-6.	" " Red, ...	" 1 " "	15
2715-7.	" " Yellow, ...	" 1 " "	15

As a substitute for Black Ink the Purple answers best of all colored Inks.



No. 2720.

No. 2720. Practical Tray, containing any five of our Inks in 1 oz. bottles, (assorted to order) . . . . . Each, $1 50

Any other tint of Waterproof Drawing or Hektograph Ink made to order.

HIGGINS' LIQUID DRAWING INKS

No. 2731.

2735.

2736.

			¾ oz.	½ Pt.	Pt.	Qt.
No. 2730.	Higgins' General Black Ink, .	Each,	$0 25	2 00	3 75	7 00
2731.	" Waterproof Black Ink,	"	25	2 00	3 75	7 00
2732.	" Colored Inks, made in the following colors: . . .	"	25	2 00	3 75	7 00

Blue, Brick Red, Brown, Carmine, Green, Indigo, Orange, Scarlet, Vermilion, Violet, Yellow.

In ordering No. 2732, please state color of ink desired.

			2 oz.	½ Pt.	Pt.	Qt.
No. 2735.	Higgins' Eternal Ink, . .	Each,	$0 10	35	60	1 00
2736.	" Engrossing Ink, .	"	20	60	1 00	1 75

For Ink Bottle Holders see next page.

INK BOTTLE HOLDERS

BOURGEOIS' LIQUID INK.

No. 2740.

No. 2742.

2750.

No. 2740. Iron Ink Bottle Holder and Paper Weight, copper oxidized finish; weight about 12 oz., ... Each, $0 50

This Bottle Holder is adapted for E. D. Co.'s or Higgins' one ounce ink bottles, and besides being very useful, is neat and attractive in appearance. The neck of the bottle projects so that it is just as handy for moving, cleaning or filling as if not in the holder.

No. 2742. Clover Ink Bottle Holder, holds 3 bottles, made of metal, Each, $0 50

(See also No. 2480, Iron Paper Weight.)

No. 2750. Bourgeois' Waterproof Black Ink, small size, . . . " 25

2751. " " " " large " . . . " 50

W. & N.'S LIQUIDS AND PREPARATIONS

SEMPLE'S WHITE.

No. 2770.

2771.

No. 2770.	Winsor & Newton's Chinese White, . .	Per bottle,	$0 30
2771.	" " Indian Ink, . . .	"	30
2772.	" " Blue, ...	"	30
2773.	" " Carmine, ...	"	30
2774.	" " Indelible Brown Ink, . .	"	30
2775.	" " Prout's Brown, . .	"	30
2776.	" " Sepia, ...	"	30
2777.	" " Gold Ink, ...	"	30
2778.	" " Oxgall, ...	"	30
2778½.	" " Vermilion, ...	"	30
2779A.	" " Chinese White in tubes, small size,	Each,	15
2779B.	" " " " " large "	"	30

No. 2779C.

2779D.

2779S.

2779C.	W. & N's Albanine, a pure photographic white, . . .	Each,	$0 30
2779D.	" Process Black, a dead black of great density,	"	30
2779S.	Semple's White, in jars, ...	"	25

E. D. CO.'S DRAFTING ROOM MUCILAGE AND PHOTO MOUNTER

No. 2780.

2782.

No. 2780.	E. D. Co.'s Drafting Room Mucilage, .	Per 4 ounce jar,	$0 15
2781.	" " " " .	" 6 " "	20
2782.	" " " " .	" 1 pint "	45
2782½.	" " " " .	" 1 quart "	85
2783.	" " " " .	" ½ gal. "	1 60
2784.	" " " " .	" 1 " "	3 00

HIGGINS' MUCILAGE AND PHOTO MOUNTER

No. 2786.	Higgins' Drawing Board Mucilage, ...	Per 3 ounce jar,	$0 15
2787.	" " " "	" 6 " "	25
2788.	Higgins' Photo Mounter, ...	" 3 " "	15
2789.	" " "	" 6 " "	25

WEIS BRUSH TUBE MUCILAGE

No. 2798.

No. 2797.	Weis Brush Tube Mucilage, small, ...	Each,	$0 05
2798.	" " " " medium, ...	"	10
2799.	" " " " large, ...	"	25

WINSOR & NEWTON'S

MOIST WATER COLORS

Whole Pan.

Half Pan.

Whole Tube.

1. Antwerp Blue
2. Bistre
3. Blue Black
5. Brown Ochre
6. Brown Pink
8. Burnt Sienna
9. Burnt Umber
10. Charcoal Grey
12. Chinese White
14. Chrome Lemon
16. Chrome Yellow
18. Cologne Earth
20. Deep Chrome
22. Dragon's Blood
24. Emerald Green
25. Flake White
26. Gamboge
28. Hooker's Green No. 1
29. Hooker's Green No. 2
30. Indigo
32. Indian Red
34. Italian Pink
36. Ivory Black
38. King's Yellow
40. Lamp Black
42. Light Red
43. Mauve
44. Naples Yellow
46. Neutral Tint
47. New Blue
48. Olive Green
50. Orange Chrome
52. Payne's Grey
53. Permanent Blue
54. Prussian Blue
56. Prussian Green
58. Raw Sienna
60. Raw Umber
62. Roman Ochre
64. Sap Green
66. Terre Verte
68. Vandyke Brown
70. Venetian Red
72. Vermilion
74. Yellow Lake
76. Yellow Ochre

No 2800P. Whole Pans, . Per doz., $3 00; Half Pans, . Per doz., $1 65
2800T. " Tubes (except Chinese White, see Nos. 2779A-B), " 3 00

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90. Alizarin Carmine
92. Alizarin Crimson
94. Alizarin Green
96. Alizarin Orange
98. Alizarin Scarlet
99. Alizarin Yellow
102. Brown Madder
104. Carmine Lake
106. Cerulean Blue
108. Crimson Lake
110. Indian Yellow
111. Leitch's Blue
112. Mars Yellow
114. Neutral Orange
116. Orange Vermilion
118. Purple Lake
120. Roman Sepia
122. Ruben's Madder
124. Scarlet Lake
126. Scarlet Vermilion
128. Sepia
130. Warm Sepia

No. 2801P. Whole Pans, . Per doz., $6 00; Half Pans, Per doz., $3 00
2801T. " Tubes, ... " " 6 00

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200. Cadmium Orange
201. Cadmium Lemon
202. Cadmium Yellow
204. Cobalt Blue
206. Cobalt Green
207. Emerald Oxide of Chromium
208. French Blue
210. Indian Purple
212. Intense Blue*
214. Lemon Yellow
216. Mars Orange
218. Oxide of Chromium
219. Oxide of Chromium, Transparent
220. Permanent Mauve
221. Permanent Violet
222. Pale Cadmium Yellow
224. Pure Scarlet*
225. Ultramarine Ash-Grey
226. Violet Carmine
228. Viridian

No. 2802P. Whole Pans, . Per doz., $7 50; Half Pans, Per doz., $3 75
2802T. " Tubes, ... " " 7 50

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300. Aureolin
302. Aurora Yellow
304. Burnt Carmine
306. Carmine
308. Field's Orange Vermilion
309. Gallstone
310. Madder Carmine
311. Madde Lake
312. Pink Madder
314. Primrose Aureolin
316. Purple Madder
318. Scarlet Madder
319. Rose Dorée
320. Rose Madder
322. Yellow Carmine

No. 2803P. Whole Pans, . Per doz., $12 75; Half Pans, Per doz., $6 38
2803T. " Tubes, ... " " 12 75

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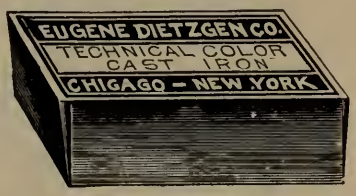
400. Smalt
402. Ultramarine Ash-Blue

No. 2804P. Whole Pans, . Per doz., $18 00; Half Pans, Per doz., $ 9 00
2804T. " Tubes, ... " " 18 00

Colors marked thus * are not prepared in Tubes.

TECHNICAL MOIST WATER COLORS

These Technical Moist Water Colors are intended for every description of coloring on professional (technical) drawings. They have been selected more with a view to sharp distinction, rather than to the representation of the actual colors of the materials, are always ready for use without mixing or dissolving, insuring uniform results and correct duplicating of tints.

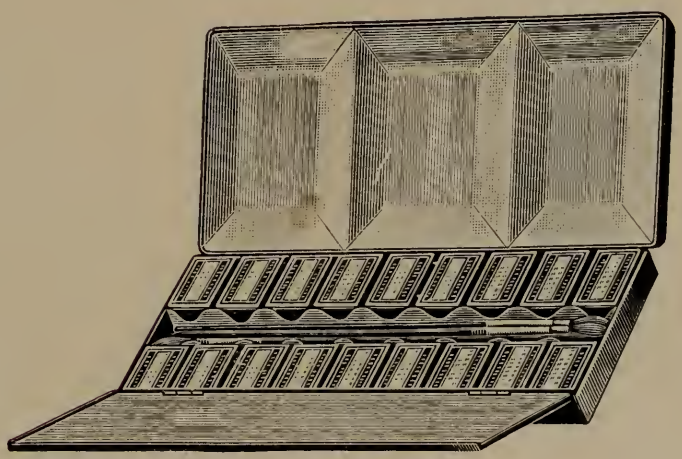


Whole pan.

Half pan.

No. 2810.

					Whole Pans.	Half Pans.
No. 2810.	1. Cast Iron	7. Brick	13. Chinese White			
	2. Wrought Iron	8. Stone	14. Gamboge			
	3. Copper	9. Brown Stone	15. Prussian Blue			
	4. Brass	10. Leather	16. Vermilion			
	5. Steel	11. Light Wood	17. Yellow Ochre			
	6. Machinery	12. Dark Wood	. . . .	Each,	$0 18	$0 10
No. 2811.	18. Carmine			"	50	25



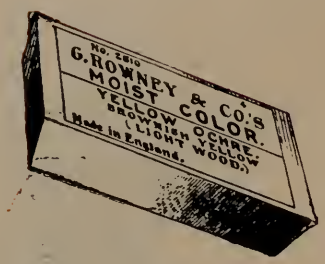
No. 2816.

			Each.
No. 2813.	Japanned Tin Box, cont'g	12 half Pans, Nos. 1 to 12 of above,	$2 00
2814.	" " " "	18 " " " 1 " 18 " "	3 00
2815.	" " " "	12 whole " " 1 " 12 " "	3 35
2816.	" " " "	18 " " " 1 " 18 " "	5 00

Each box contains also 1 each Brushes No. 2920-2-6.

For Empty Tin Boxes see Nos. 2850-2858.

GEO. ROWNEY & CO.'S MOIST WATER COLORS



Whole Pan (moist).

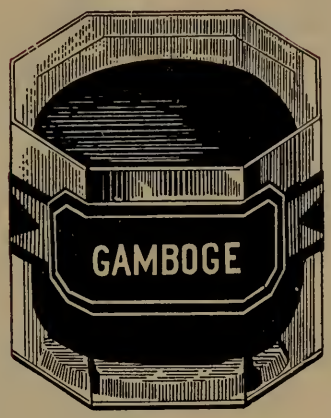
Half Pan (moist).

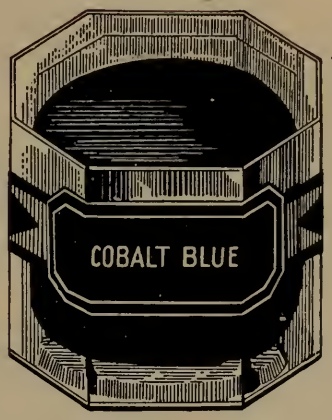
Twenty-four colors judiciously selected for Technical Coloring, and at the same time comprising a complete assortment that enables anyone familiar with mixing colors to produce any desired tint.

No. 2830.	1. Chrome Yellow (Brass),	Whole Pan,	$0 20
	2. Gamboge (Yellow),		
	3. Deep Chrome (Copper)		
	4. Yellow Ochre (Light Wood),		
	5. Burnt Sienna (Dark Wood),		
	6. Venetian Red (Brick),		
	7. Indian Red (Brown Stone),		
	8. Burnt Umber (Brown),		
	10. Neutral Tint (Cast Iron),		
	11. Payne's Grey (Stone),		
	12. Vermilion (Blood Red),	Half Pan,	$0 12
	15. New Blue (Sky Blue),		
	17. Prussian Blue (Steel),		
	18. Indigo (Wrought Iron),		
	19. Emerald Green (Brightest Green),		
	20. Hooker's Green No. 2 (Dark Green),		
	21. Sap Green (Light Green),		
	22. Lamp Black,		
	23. Chinese White,		
	24. Raw Umber,		
2831.	9. Sepia (Sombre Brown),	Whole Pan,	$0 40
	13. Crimson Lake (Rose Tint),	Half Pan,	20
2832.	16. Cobalt Blue (Sky Blue),	Whole Pan,	60
		Half Pan,	30
2833.	14. Carmine (Richest Red),	Whole Pan,	80
		Half Pan,	40

BOURGEOIS' FRENCH WATER COLORS

IN GLASS POTS.





These pots contain more than double the quantity sold in whole pans of other manufacturers at nearly the same price.

They are in a moist state. The user has but to moisten his brush and slightly rub the colors desired to find that it will readily yield the full richness of its tint.

No. 2835. Each, $0 30

2. Antwerp Blue	28. Gamboge	54. Payne's Grey	
4. Brown Ochre	30. Green Lake	56. Prussian Blue	
6. Brown Pink	32. Hooker's Green	58. Prussian Green	
8. Burnt Sienna	34. Indian Red	60. Raw Sienna	
10. Burnt Umber	36. Indigo	62. Raw Umber	
12. Chinese White	38. Italian Pink	64. Sap Green	
14. Chrome Green, Light	40. Ivory Black	66. Sepia	
16. Chrome Green, Medium	42. Lamp Black	68. Terre Verte	
18. Chrome Green, Dark	44. Lemon Yellow	70. Vandyke Brown	
20. Chrome Yellow, Light	46. Light Red	72. Venetian Red	
22. Chrome Yellow, Dark	48. Naples Yellow	74. Warm Sepia	
24. Dragon's Blood	50. Neutral Tint	76. Yellow Ochre	
26. Emerald Green	52. Olive Green		

No. 2836. Each, $0 50

100. Brilliant Yellow	110. Ultramarine Blue, Light	116. Vermilion, Dark
102. Celestial Blue	112. Ultramarine Blue, Dark	118. Violet Light, Extra
104. Crimson Lake	114. Vermilion Light	120. Violet Dark, Extra
106. Dark Purple		
103. Scarlet Vermilion		

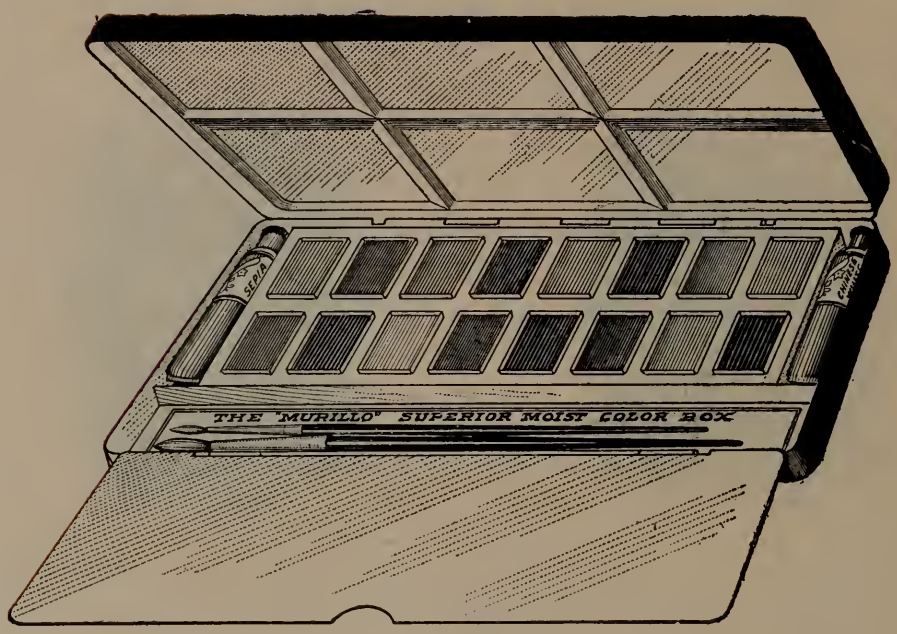
No. 2837. Each, $0 75

200. Brown Madder	208. Cypress Green, Dark	216. Rose Carthame, Light
202. Carmine	210. Geranium Rose	218. Rose Carthame, Dark
204. Cerulean Blue	212. Madder Lake, Light	220. Scarlet Lake
206. Cypress Green, Light	214. Madder Lake, Dark	

No. 2838. Each, $1 00

300. Cadmium Citron	304. Cadmium Yellow	308. Indian Yellow
302. Cadmium Deep	306. Cobalt Blue	

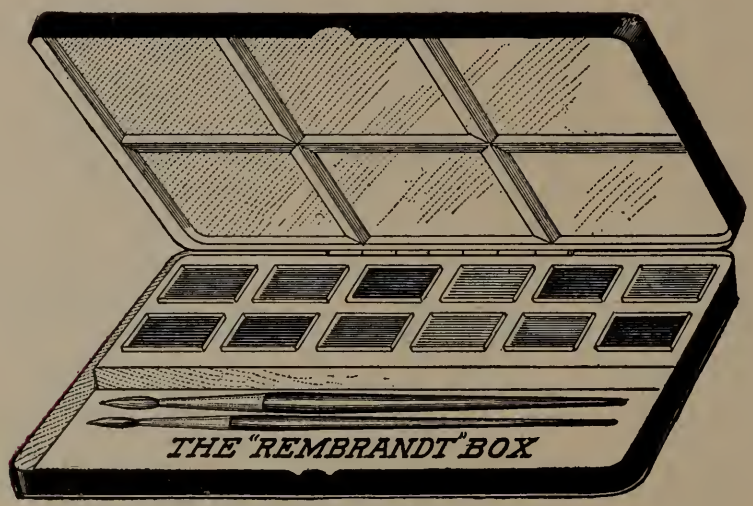
WATER COLOR BOXES



No. 2840.

No. 2840. Murillo Water Color Box, japanned tin box, $7\frac{1}{2}\times3\frac{1}{4}$ in., with inside lid, 16 moist colors in metal pans, 1 tube each Chinese White and Sepia, 2 brushes, ... Per doz., $12 00

2841. Small Murillo Water Color Box, japanned tin box, $6\frac{1}{2}\times3\frac{1}{4}$ in., 12 moist colors in metal pans, 1 tube each Chinese White and Sepia, 2 brushes, ... Per doz., 9 00



No. 2840.

No. 2842. Rembrandt Water Color Box, japanned tin box, $6\frac{1}{4}\times2\frac{3}{4}$ in., 12 moist colors in metal pans, 2 brushes, ... Per doz., $4 70

WINSOR & NEWTON'S

WATER COLOR BOXES

Fitted with Cake Water Colors.

No. 2845A.

No. 2845C.

2846H.

FULL CAKE BOXES FITTED

No. 2845A.	12 Cakes, Mahogany "Slide Lid" Box, . . .	Each,	$ 5 00
2845B.	18 " " " " "	"	7 50
2845C.	12 " " "Lock and Drawer" Box, fitted,	"	7 25
2845D.	18 " " " " " " "	"	10 00
2845E.	12 " " "Complete" Box, fitted, . .	"	9 00
2845F.	18 " " " " " . .	"	13 50
2845G.	24 " " " " " . .	"	18 00

HALF CAKE BOXES FITTED

No. 2846A.	12 Half Cakes, Mahogany "Slide Lid" Box, . .	Each,	$ 2 75
2846B.	18 " " " " " " . .	"	4 00
2846C.	12 " " " "Lock and Drawer" Box, fitted,	"	5 25
2846D.	18 " " " " " " " "	"	6 50
2846E.	12 " " " "Complete" Box, fitted, .	"	6 00
2846F.	18 " " " " " " . .	"	7 75
2846G.	12 " " " "Caddy Lid" Box, complete, fitted, ...	"	8 50
2846H.	18 Half Cakes, Mahogany "Caddy Lid" Box, complete, fitted, ...	"	10 75

The "Slide Lid" Box contains Brushes, and the "Lock and Drawer" and "Complete" Boxes contain Brushes, Pencils, Ink and Slant. The "Caddy Lid" Box contains Sable Brushes and superior fittings.

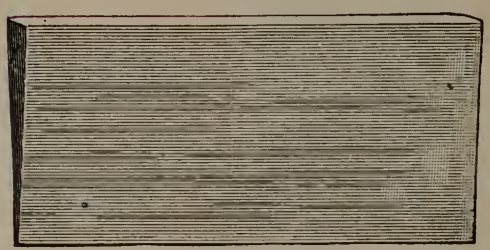
EMPTY JAPANNED TIN BOXES

For Moist Colors in Pans.

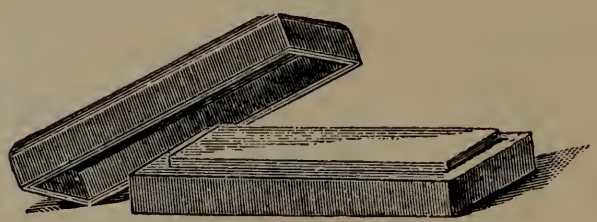
No. 2854.

No. 2850.	For 6	Whole or	12	Half	Pans,	Each,	$0 80
2851.	" 8	"	" 16	"	"	"	90
2853.	" 10	"	" 20	"	"	"	1 05
2854.	" 12	"	" 24	"	"	"	1 15
2855.	" 16	"	" 32	"	"	"	1 30
2857.	" 18	"	" 36	"	"	"	1 40
2858.	" 24	"	" 48	"	"	"	1 60

ARKANSAS OIL STONES



No. 2890.



2895.

No. 2890.	Arkansas Oil Stone, wedge shape slip,		Each,	$0 30
2891.	" " "	about $1\frac{1}{4}\times 3$ in.,	"	50
2892.	" " "	" $1\frac{1}{4}\times 4\frac{5}{8}$ in.,	"	90
2895.	" "	in case, with cover, 3 in.,	"	75
2896.	" " "	" 5 "	"	2 00

QUILL BRUSHES

Of Camel Hair and Red Sable.

Illustrations full size.

Nos. 2900–2901.

No. 2900. Camel Hair in Quills.

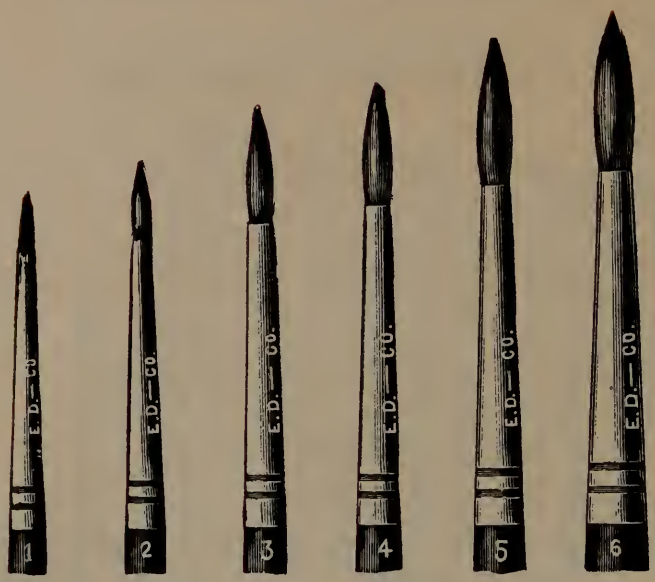
Nos.	1	2	3	4	5	6	7	8
Each,	$0 05	05	06	06	08	08	10	10

No. 2901. Red Sable in Quills.

Nos.	1	2	3	4	5	6	7	8
Each,	$0 12	15	20	25	30	35	50	60

CAMEL HAIR BRUSHES

In Tin with Handle.



Illustrations full size.

		Nos.	1	2	3	4	5	6
No. 2920.	Camel Hair Brushes, ...	Each,	$0 06	08	08	10	10	12

In Tin with Handle.

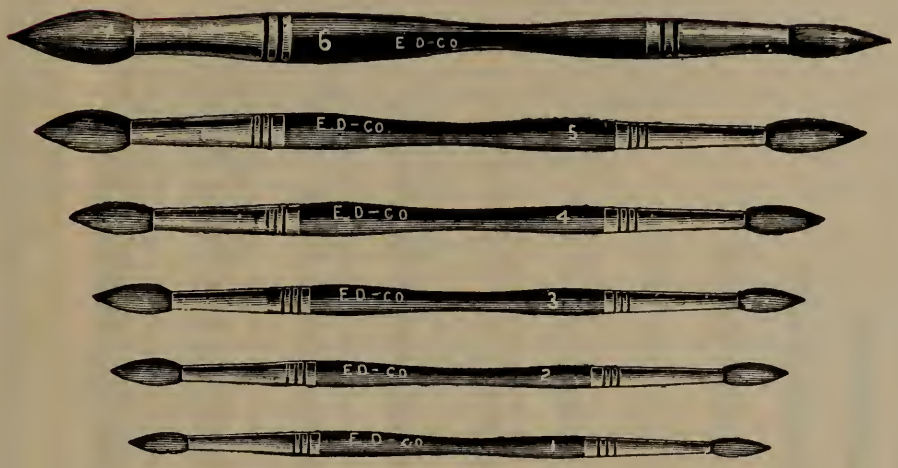
Illustrations full size.

		Nos.	7	8	9	10	11	12
No. 2920.	Camel Hair Brushes, ...	Each,	$0 18	20	20	25	30	35

DOUBLE-POINTED BRUSHES

Of Camel Hair and Red Sable.

Illustrations ½ size.

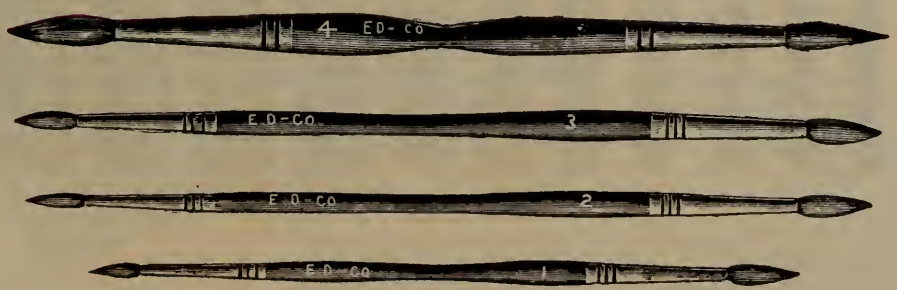


No. 2930.

No. 2930. Double-pointed Camel Hair Brushes, in Tin.

Nos.	1	2	3	4	5	6
Each,	$0 25	30	35	45	55	60

Illustrations less than ½ size.



No. 2933.

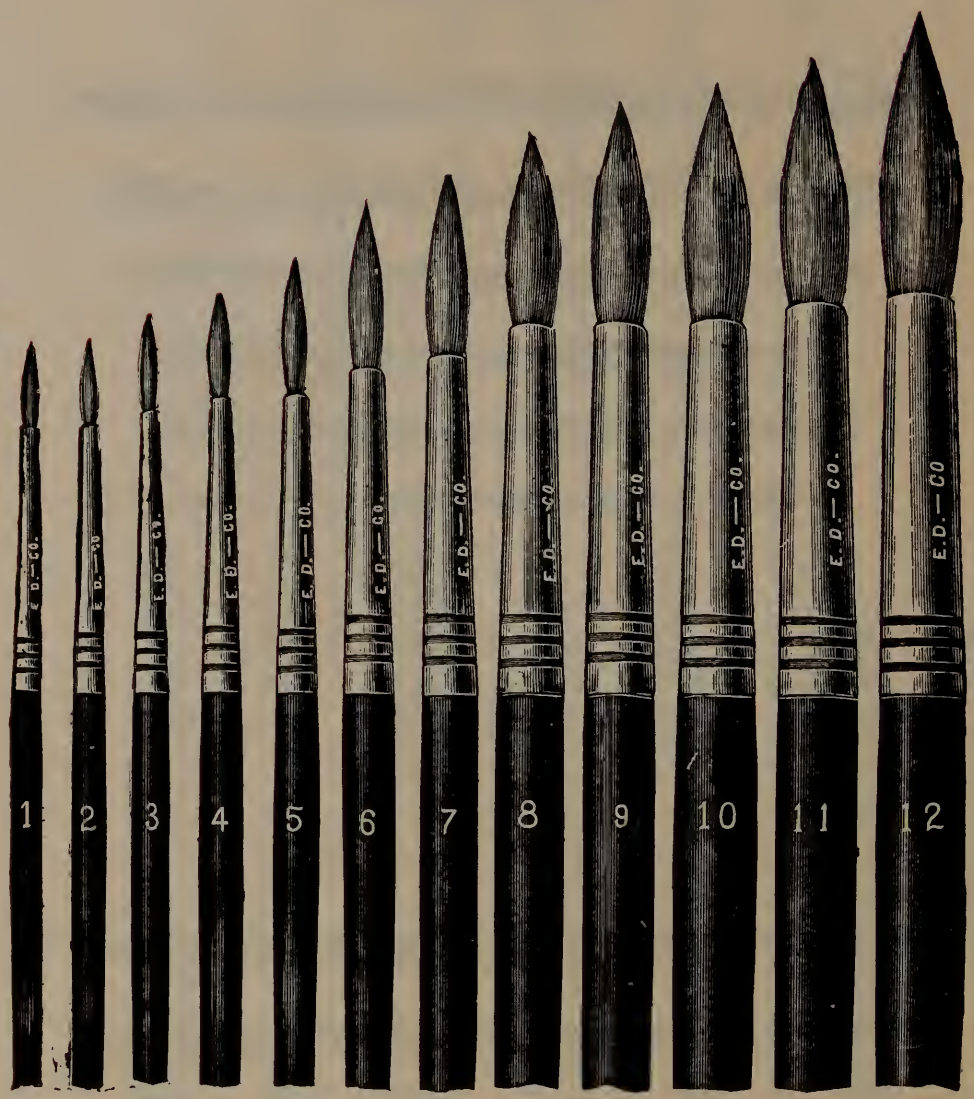
No. 2933. Double-pointed Red Sable Brushes, in Albata.

Nos.	1	2	3	4
Each,	$0 60	90	1 50	2 40

RED SABLE BRUSHES

In Albata, with Handle.

Illustrations full size.



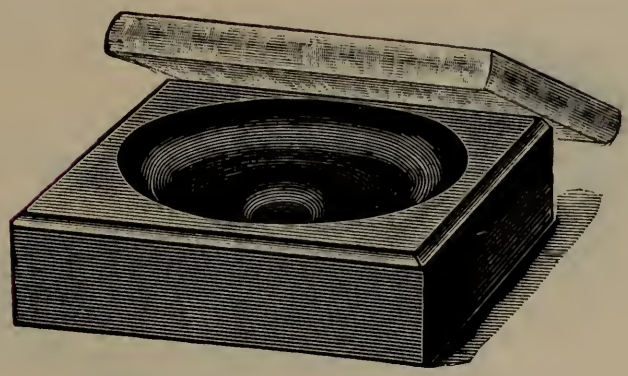
No. 2940.

No. 2940. Red Sable Brushes, in Albata, with Handle.

Nos. .	1	2	3	4	5	6	7	8	9	10	11	12
Each,	$0 15	18	25	30	40	55	70	90	1 20	1 50	2 00	2 50

We omit to list the Black Sable Brushes because they are more expensive and at the same time less firm in their points than the Red Sable Brushes.

SLATE INK SLABS

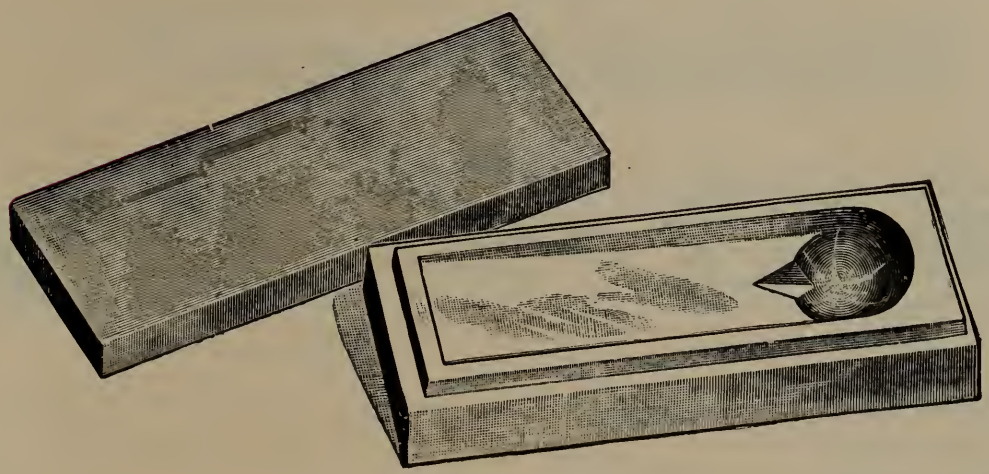


No. 3000.

Slate Ink Slabs Nos. 3000-3001, heavy Plate Glass Cover, with ground edges, are the *best* for rubbing up Chinese or Japanese Inks uniformly and quickly. The Plate Glass Cover fits air-tight, and the deep well in the center gathers the ink for convenient filling of the pen.

No. 3000.	Slate Ink Slab, $3\frac{1}{2}$ in. square, with improved well, . .	Each, $0 45
3001.	" " " 5 " " " " " " . .	" 65
3005.	" " " $3\frac{1}{2}$ " " plate glass cover, with edges not ground, and less heavy than No. 3000 . . .	" 35

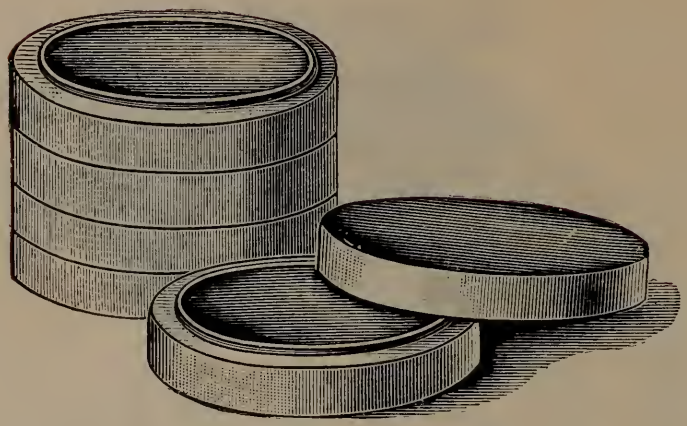
CHINA INK SLABS



No. 3007.

No. 3007.	China Ink Slab, with cover, $1\frac{3}{4}\times4\frac{1}{2}$ in., ...	Each, $0 35
3008.	" " " " " $2\frac{1}{8}\times5\frac{1}{4}$ "	" 40

NESTS OF CABINET SAUCERS



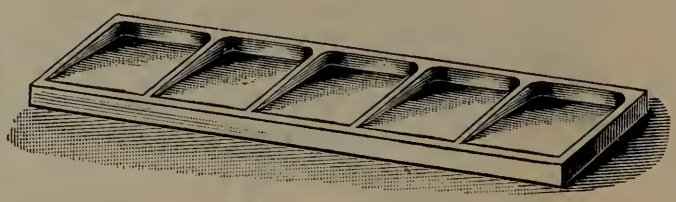
No. 3010.

No. 3010.	Nest of Cabinet Saucers,	6 in set,	$2\frac{3}{8}$ in.,	. . . .	Each,	$0	55
3011.	" " "	6 "	$2\frac{5}{8}$ "	. . . . .	"		65
3012.	" " "	6 "	$3\frac{1}{4}$ "	. . . . .	"		75
3013.	" " "	6 "	$3\frac{3}{4}$ "	. . . . .	"		90
3014.	" " "	deep, 4 in set,	$2\frac{5}{8}$ in.,	. .	"		75
3015.	" " "	" 4 "	$3\frac{1}{4}$ "	. . .	"		90
3016.	" " "	" 4 "	$3\frac{3}{4}$ "	. .	"	1	10

A "Nest of 6" consists of 5 saucers and cover; a "Nest of 4" of 3 saucers and cover.

INK AND COLOR SLABS

No. 3025.

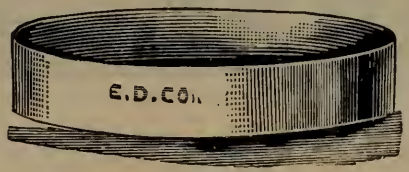


3032.

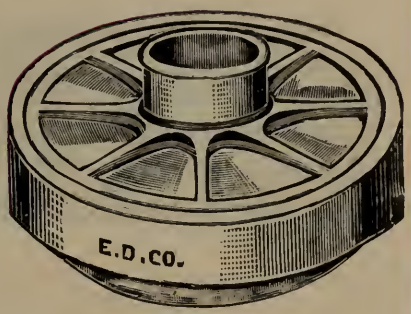
No. 3025.	Color Slabs, 3 wells and 3 slopes,		$2\frac{1}{2}\times4$ in.,	. . . .	Each,	$0	25
3026.	" " 5 "	" 5 "	4 $\times7\frac{1}{2}$ "	. . . .	"		60
3032.	Sloping Tiles, 5 divisions,		$3\frac{1}{8}\times7\frac{3}{4}$ in.,	. . . .	"		40
3033.	" " 6 "		$3\frac{1}{8}\times7\frac{3}{4}$ "	. . . .	"		40
3034.	" " 8 "		6 $\times7\frac{5}{8}$ "	. . . .	"		60

INK AND COLOR SLABS *Continued*

No. 3042.

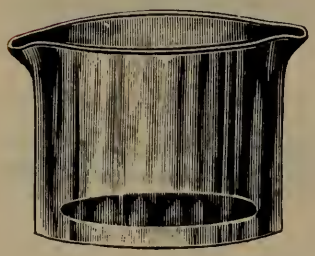


No. 3040.



3045.

No. 3040.	China Color Cups, ...	2½	3	3½ in. diameter.
	Each, ...	$0 07	10	20	
3042.	China Brush Rest, 5½ in. long, ...			Each,	$0 15
3045.	Architects' Slant and Basin, 8 divisions and cup, 7 in. diam., Each, ...				1 35

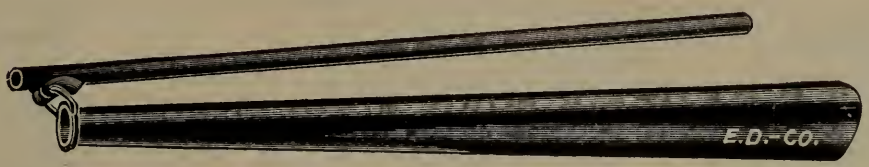


No. 3050.

ARTISTS' WATER GLASSES

No. 3050.	Artists' Water Glass, 2⅜ in. diameter, Each, ...	$0 12
3052.	Artists' Water Glass, 3¼ in. diameter, Each, ...	25

ATOMIZER



No. 3060.

No. 3060. Atomizer, japanned tin, folding, ... Each, $0 15

FIXATIF

No. 3062. Colorless Fixatif, for Crayon or Charcoal, Per 2-oz. bottle, ... $0 20

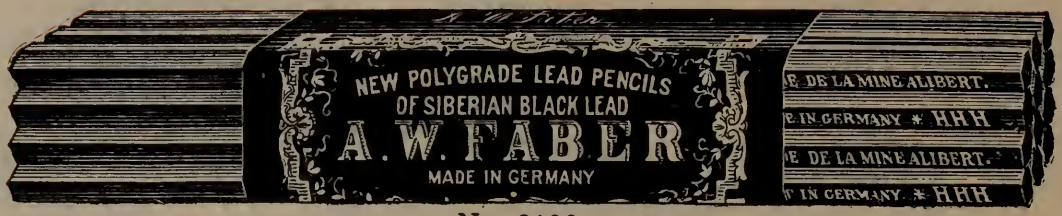
3063. Colorless Fixatif, for Crayon or Charcoal, Per pint bottle, ... 1 00

No. 3062.

CHARCOAL

No. 3070.	Charcoal, fine, 50 sticks in a box, . .	Per dozen boxes, $1 80
3072.	" Venetian, 50 sticks in a box, .	" " " 6 00

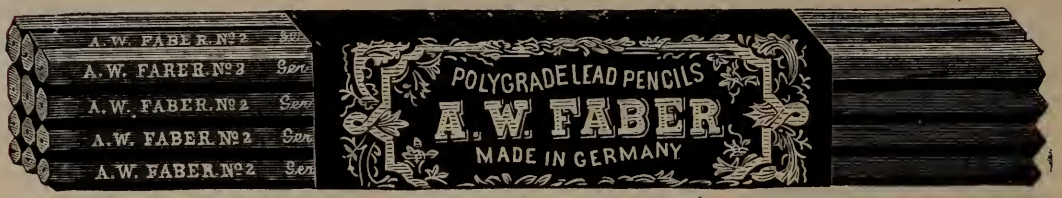
A. W. FABER'S PENCILS



No. 3100.

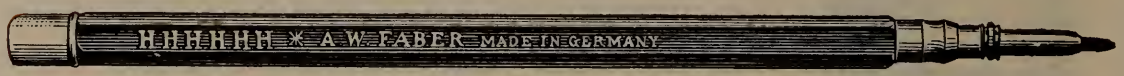
No. 3100. A. W. Faber's Siberian Pencils, Hexagon. In degrees as follows: 2 B, B, HB, F, H, 2 H, 3 H, 4 H, 5 H, 6 H, Per doz., $1 25

3100½. A. W. Faber's Siberian Pencils, Hexagon, with **broad leads**. In degrees as follows: H, 2 H, 3 H, 4 H, 5 H, 6 H. . . . . Per doz., 1 25



No. 3101.

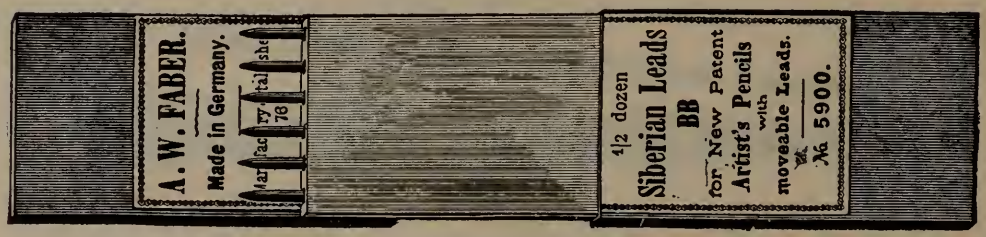
No. 3101. A. W. Faber's Hexagon Gilt Pencils, Nos. 1, 2, 3, 4, 5, . Per doz., $0 75



No. 3111.

No. 3110. Artists' Pencil, with Siberian Lead, double pointed, . . Each, $0 35

3111. " " " " " single " . . " 25



No. 3120.

No 3120. Siberian Leads, 6 in box, No. 2B to 6H, like No. 3100, Per box, $0 65

A. W. FABER'S COLORED PENCILS

No. 3125.

No. 3122. Red and Blue Pencils, hexagon, best, ... Per doz., $1 25

3123. " " " " round, ... " 75

3124. Red Pencils, round, ... " 75

3125. Blue " " . . . . . " 75

3126. Yellow " " . . . . . " 75

3127. Green " " . . . . . " 75

A. W. FABER'S WAX CRAYONS

No. 3140.

BROWNS.

36, Brown Ochre.
34, Burnt Sienna.
32, " Umber.
43, Indian Brown, No. 1.
28, " " " 2.
35, Purple "
61, Raw Umber, No. 1.
33, " " " 2.
52, " " " 3.
55, " " " 4.
60, Red Brown.
6, Roman Ochre.
87, Vandyke Brown,

BLUES.

58, Antwerp Blue, Light.
50, " " Deep.
65, Indigo.
88, Light Blue.
12, Prussian Blue.
13, Ultramarine.

GREENS.

63, Chrome Green, No. 1.
57, " " " 2.
69, " " " 3.
39, Olive Green, No. 1.
47, " " " 2.
40, " " " 3.
56, " " " 4.
29, Prussian Green, No. 1.
45, " " " 2.
53, Yellow Green.

VARIOUS.

41, Black.
21, Gray.
54, Purple.
51, Violet.
1, White.

REDS.

75, Crimson.
16, Flesh Tint, No. 1.
18, " " " 2.
42, Indian Red, " 1.
30, " " " 2.
70, Pink, Light.
72, " Dark.
20, Red Lead.
46, Scarlet.
38, Vermilion.

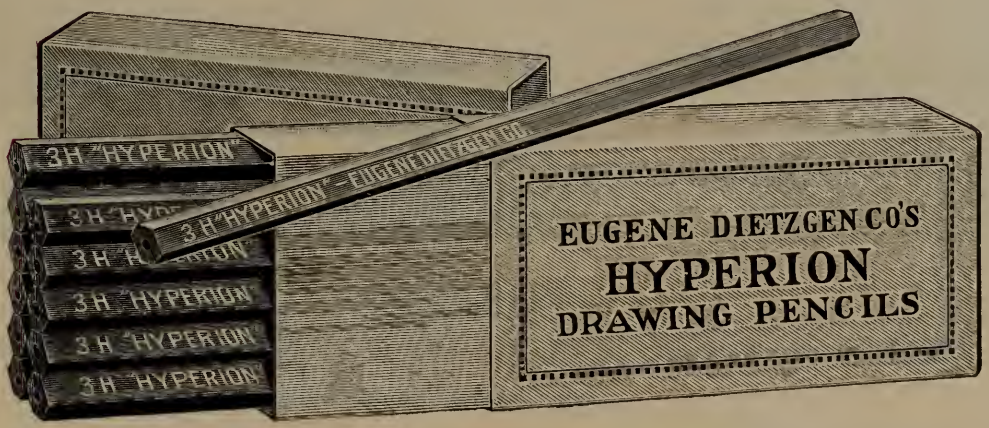
YELLOWS.

2, Chrome Yellow, Pale.
4, " " Med.
62, " " Deep.
64, Italian Pink.
59, Primrose Yellow.
37, Yellow Ochre.

		Each,	Per doz.
No. 3140.	A. W. Faber's Wax Crayons, colors listed above,	$0 10	$0 90
3141.	A. W. Faber's Wax Crayons, in boxes.		

Assorted Colors,	6	12	18	24	36	48
Each,	$0 60	1 00	1 50	2 00	3 00	4 00

HYPERION DRAWING PENCILS



No. 3200.

The Hyperion Drawing Pencils are of superior quality, correctly and uniformly graded, contain no grit and will hold their points well. They are made in 11 degrees of hardness to meet all practical requirements.

No. 3200.	Hyperion Drawing Pencils, Hexagon, yellow polish. In degrees as follows: 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H, ... Per doz.,	$0 60
3210.	Hyperion Copying Ink Pencils, Violet, round, . "	75

HARDTMUTH'S KOH-I-NOOR PENCILS

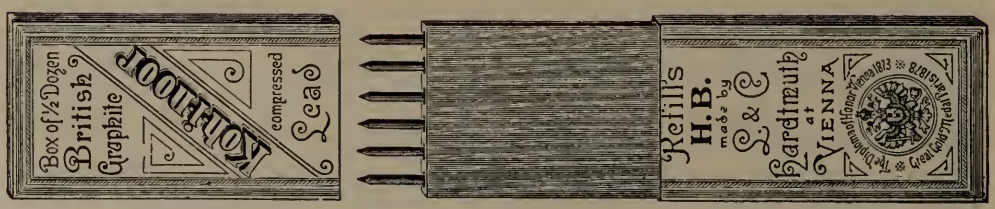
No. 3250.

By a new process of manufacture the graphite assumes a highly compressed form, which secures for it remarkable lasting qualities, the pencil point remaining sharp for a surprisingly long time. For the draftsman and others, where the preservation of a fine point is of importance, the Koh-i-noor Pencils and Leads will be found invaluable.

No. 3250. Koh-i-noor Pencils, Hexagon, Yellow Polish. In degrees as follows:
3 B, 2 B, B, HB, F, H, 2 H, 3 H, 4 H, 5 H, 6 H, 7 H, 8 H, Per doz., $1 25
4 B, ... " 1 50
6 B, 5 B, ... " 1 80

No. 3260.

No. 3260. Koh-i-noor Artists' Pencil with lead, double pointed, . Each, $0 35
3261. " " " " single " . " 25



No. 3270.

No. 3270. Koh-i-noor Leads, 6 in box, all grades, from 6 B to 8 H, Per box, $0 60

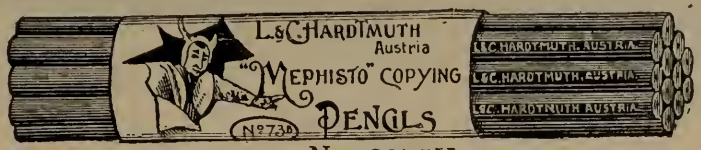
No. 3271.

No. 3271. Koh-i-noor Copying Ink Pencils, Violet, round, . . Per doz., $1 25

HARDTMUTH'S MEPHISTO PENCILS

No. 3273.

No. 3273. Hardtmuth's Mephisto Pencils, Hexagon, Black Polish. In 6 degrees, as follows: Nos. 1 = BBB, 2 = B, 3 = HB, 4 = HH, 5 = HHH, 6 = HHHH, ... Per doz., $0 75



No. 3275V.

				Per doz.
No. 3275V.	Mephisto Copying Ink Pencils,	No. 73B,	Violet, round,	$0 75
3275B.	" " " "	" 73B,	Blue, "	75
3275D.	" " " "	" 73B,	Black, "	75
3275G.	" " " "	" 73B,	Green, "	75
3275R.	" " " "	" 73B,	Red, "	75
3275½.	" " Ext. Hard "	" 73B,	Violet, "	85
3276.	" " Red Tip "	" 77,	" "	85

No. 3280.

No. 3280. Hardtmuth's Wax Crayons, in wood: No. 51, Gamboge; No. 52, Orange Chrome; No. 57, Raw Sienna; No. 60, Vandyke Brown; No. 63, Sepia; No. 64, Black; No. 67, Sap Green; No. 71, Light Green; No. 75, Cobalt Blue; No. 78, Dark Blue; No. 80, Violet Carmine; No. 85, Vermilion; No. 87, Rose Madder; No. 94, Yellow; No. 100, White; Per doz., $1 00; Each, $0 10

3285.	Hardtmuth's Red Pencils, round, ...	Per doz.,	75
3286.	" Blue " "	"	75
3287.	" Red and Blue Combination Pencils, round,	"	75

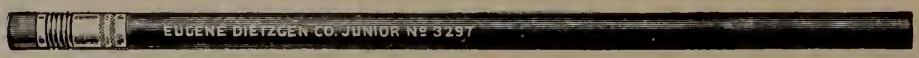
No. 3291.

3290.	Hardtmuth's Round Lumber Crayons, Black, . .	Per doz.,	$0 50
3291.	" " " " Blue, . .	"	50
3292.	" " " " Red, . .	"	60

E. D. CO.'S DETAIL PENCILS

No. 3295.

No. 3295. E. D. Co.'s Detail Drawing Pencils, Nos. 1, 2, 3, 4, 5, Per doz., $0 35
3296. E. D. Co.'s Sketching Pencils, ... " 50



No. 3297.

No. 3297. E. D. Co.'s "Junior" Pencils, round, grade No. 2, rubber tipped, ... Per doz., $0 30

PENCIL HOLDERS

No. 3298.

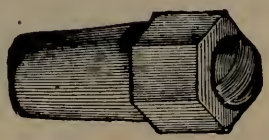
No. 3299.

No. 3298. E. D. Co.'s Pencil Holder, single end, ... Each, $0 05
3299. " " " double end, ... " 10

No. 3300.

No. 3300. Pencil Point Protector, round, ... Each, $0 05

No. 3304.



3306.

No. 3304. Pencil Point Protector, hexagon, with rubber, . . Each, $0 05
3306. Rubber Pencil Tips, hexagon. . . . . Per doz., 15

DIXON'S PENCILS AND CRAYONS

No. 3310.

No. 3310. Dixon's "Cabinet" Pencils, hexagon, rubber tipped, stamped in gold, grades No. 2 and 3, ... Per doz., $0 50

No. 3311B.

No. 3311B.	Dixon's "Best" Solid Crayons,	Blue,	round,	7 in.,	Per doz.,	$1	00
3311D.	" " " "	Black,	"	7 "	"	1	00
3311G.	" " " "	Green,	"	7 "	"	1	00
3311R.	" " " "	Red,	"	7 "	"	1	00
3311Y.	" " " "	Yellow,	"	7 "	"	1	00

No. 3311H.

No. 3311H. Dixon's Solid Crayon Holder, nickel plated, 6½ in., for Crayons Nos. 3311B–3311Y, ... Per doz., $0 60

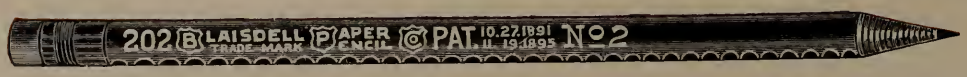
No. 3313D.

No. 3312B.	Dixon's Lumber Crayon,	Blue,	hexagon,	. .	Per doz.,	$1	20
3312G.	" " "	Green,	"	. .	"	1	20
3312R.	" " "	Red,	"	. .	"	1	20
3312T.	" " "	Ter. Cotta,	"	. .	"	1	20
3312W.	" " "	White,	"	. .	"	1	20
3312Y.	" " "	Yellow,	"	. .	"	1	20
3313D.	" " "	Black,	"	extra soft,	"	1	00

RED CHALK

3315½. Red Chalk (Keel), in fingers (chunks), . . . Per lb., 15

BLAISDELL'S
PAPER PENCILS AND CRAYONS



No. 3316B.

No. 3316A.	Blaisdell's Paper Pencils, plain, grade No. 2, .	Per doz.,	$0 50
3316B.	" " " with rubber tip, grade No. 2, "		60

No. 3317A.

No. 3317A.	Blaisdell's Crayons, Blue, ...	Per doz.,	$0 90
3317B.	" " Red, ...	"	90
3317C.	" " Black, ...	"	90
3317D.	" " Green, ...	"	90
3317E.	" " Yellow, ...	"	90
3317F.	" " Brown, ...	"	90
3317G.	" " White, ...	"	90

E. D. CO'S "UNION" LUMBER CRAYONS

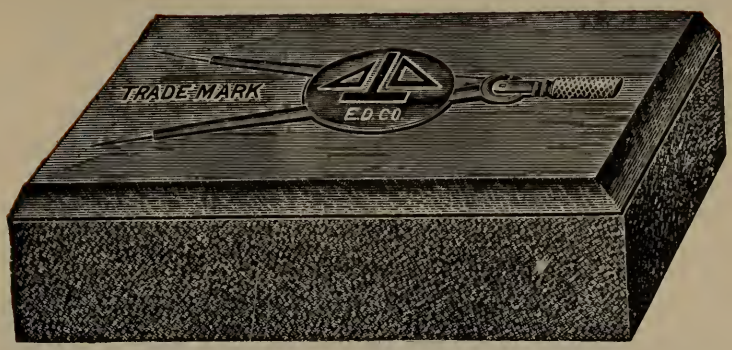
EXTRA LARGE SIZE.

No. 3319B.

No. 3319B.	Union Lumber Crayons, Blue, hexagon, . .	Per doz.,	$0 80
3319D.	" " " Black, " . .	"	80
3319G.	" " " Green, " . .	"	80
3319R.	" " " Red, " . .	"	80
3319T.	" " " Brown, " . .	"	80
3319Y.	" " " Yellow, " . .	"	80

SPONGE RUBBER

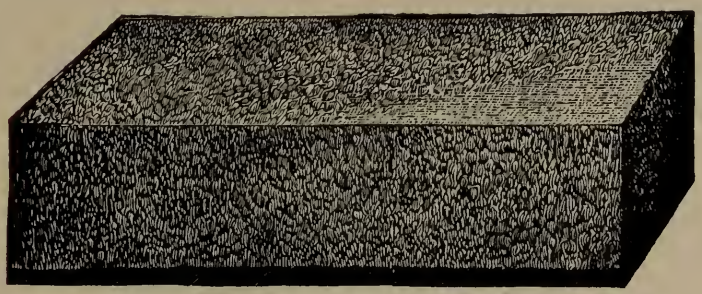
For Cleaning Drawings.



No. 3321.

Full Size Illustration.

No. 3321. Sponge Rubber, medium, rubber back, $2\frac{1}{2} \times 1\frac{3}{4} \times \frac{5}{8}$ in., . Each, $0 30

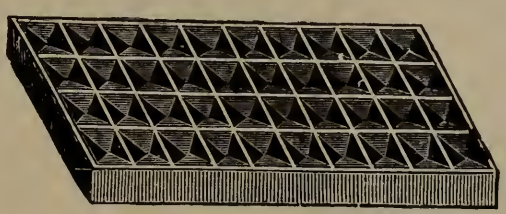


No. 3322.

No. 3321A.	Sponge Rubber,	1×1×1 in.,	Each,	$0 12
3321B.	" "	2×2×1 "	"	30
3322.	" "	4×2×1 "	"	60
3323.	" "	6×4×1 "	"	1 80

Nos. 3321-3323, Sponge Rubbers, are best adapted for cleaning drawings, etc., without disturbing drawn lines or figures or surface of paper.

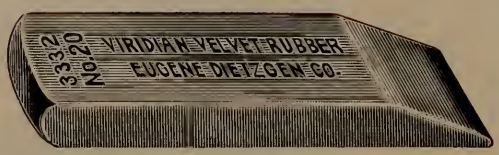
MOLDED RED RUBBER



No. 3325.

No. 3325. Molded Red Rubber, for cleaning drawings and erasing pencil marks, ... Each, $0 20

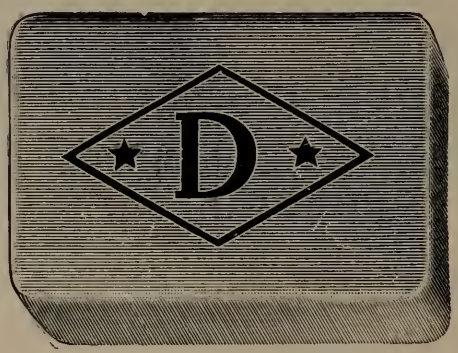
RUBBER PENCIL ERASERS



	No. 3330.	3332.
No. 3330.	Velveteen Rubber, **gray,** oblong, beveled, 3 sizes.	
	Pieces to the box, ... 40	20 12
	Per piece, ... $0 06	12 20
	Per box, ...	$2 25
3332.	Viridian Rubber, **green,** oblong, beveled, 3 sizes.	
	Pieces to the box, ... 40	20 12
	Per piece, ... $0 06	12 20
	Per box, ...	$2 25

No. 3333.

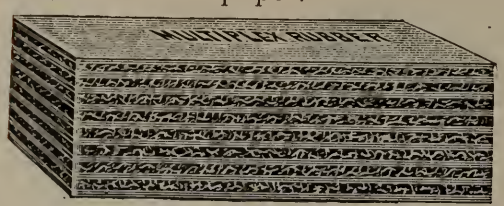
No. 3333.	Maroon Rubber, **red,** oblong, beveled, 3 sizes.	
	Pieces to the box, ... 40	20 12
	Per piece, ... $0 06	12 20
	Per box, ...	$2 25



No. 3335.

No. 3335.	E. D. Co.'s Flexible Rubber, **gray,** flat, 6 sizes.						
3336.	" " " **pink,** " 6 "						
	Pieces to the box, ...	40	30	20	12	8	4
	Per piece, ...	$0 05	07	10	17	25	50
	Per box, ...						$2 00

Nos. 3330-3336 Rubber Erasers are made of the finest quality erasive rubber. They are soft and flexible and erase rapidly without injuring the surface of the paper.



No. 3340.

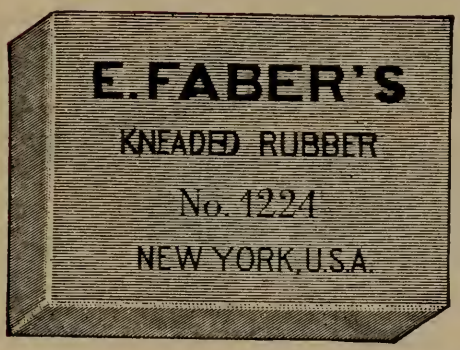
No. 3340. Multiplex Rubber, oblong, 5 sizes.

Pieces to the box,	60	30	20	12	6
Per piece,	$0 05	10	15	25	50
Per box, . . .					$3 00

RUBBER PENCIL ERASERS *Continued*

No. 3342A.

No. 3342A.	E. Faber's Emerald Eraser, green, small, ...	Each,	$0 05
3342B.	" " " " large, . . .	"	10
3342C.	" Ruby Eraser, red, small, ...	"	05
3342D.	" " " " large, ...	"	10



No. 3345.

3350.

No. 3344.	E. Faber's Kneaded Rubber, small,	Per box of 36,	$1 50; Each, $0 05
3345.	" " " large,	" " 12,	1 00; " 10
3350.	A. W. Faber's Artists' Rubber.		

Pieces to the box, .	40	30	24	20	16	12	8	4
Per piece, . . .	$0 06	08	10	12	15	20	25	50
Per box, ...								$1 80

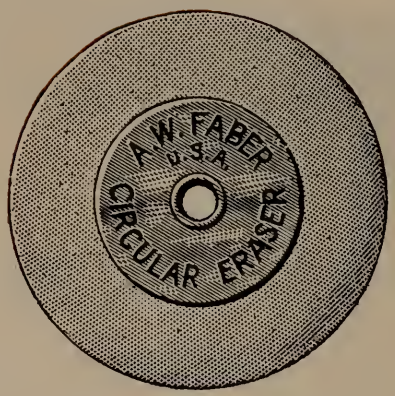
ART GUM

No. 3351B

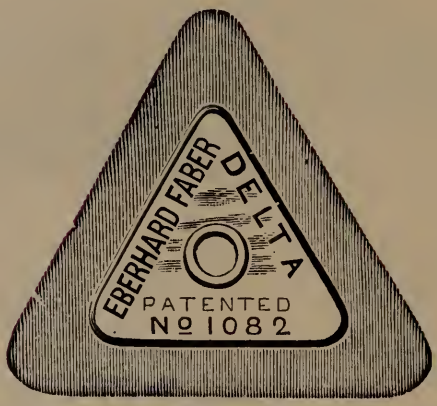
For cleaning engravings, drawings, paintings, books and papers. Is soft and friable and entirely free from grit. It wears itself away, but does not mar or scratch the surface of the paper.

No. 3351A.	Art Gum, $1\frac{1}{8} \times 1\frac{1}{8} \times 1\frac{1}{8}$ in., ...	Each,	$0 05
3351B	" " 2 × 1 × 1 in., ...	"	07
3351C.	" " $2\frac{1}{4} \times 1\frac{1}{8} \times 1\frac{1}{8}$ in., ...	"	10
3351D.	" " 3 × 2 × 1 in., ...	"	15
3351E.	" " 3 × 3 × 2 in., ...	"	25

RUBBER INK ERASERS



No. 3352.

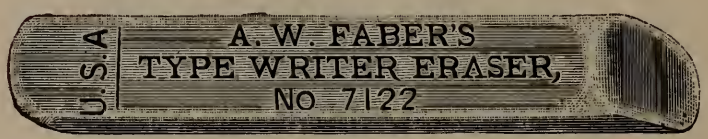


3354.

No. 3352.	Faber's Circular Eraser, ...	Each,	$ 05
3354.	" Delta "	"	05

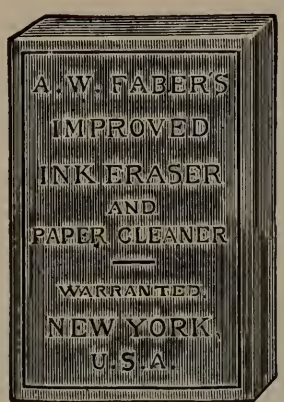
No. 3355.

No. 3355.	E. D. Co.'s Typewriter Eraser, small, ...	Each,	$0 05
3356.	" " " " large, ...	"	10

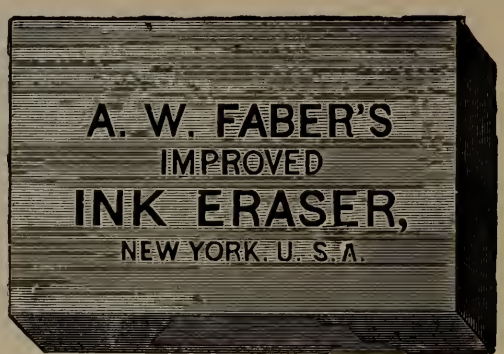


No. 3357.

No. 3357.	Faber's Typewriter Eraser, small, ...	Each,	$0 05
3358.	" " " large, ...	"	10



No. 3360.



3361.

No. 3360.	A.W. Faber's Ink Erasers, small,	Per box of 50, $2 25;	Each, $0 05
3361.	" " " large,	" " 25, 2 25;	" 10
3362.	" " " extra large,	" 12, 2 25;	" 20

RUBBER INK AND PENCIL ERASERS

No. 3365.

No. 3365. E. Faber's Union Ink and Pencil Eraser, ... Each, $0 05

No. 3367.

No. 3367. E. Faber's Elite Ink and Pencil Eraser, metal oxidized band, ... Each, $0 05

No. 3370.

No. 3370. A. W. Faber's Ink and Pencil Eraser, in wood, . Each, $0 15
3371. " " " " large, " 25

No. 3375.

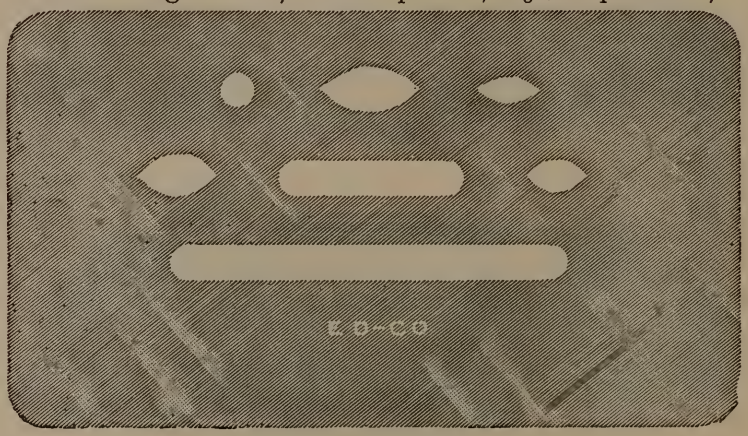
No. 3375. A. W. Faber's Ink and Pencil Eraser, in pencil form. Each, $0 15
3376. " Ink Eraser, in pencil form, . . . " 15
3377. " Pencil Eraser, in pencil form, . . " 15

ERASING SHIELDS

Made of thin, flexible metal, or transparent celluloid, with slots and holes of various sizes, so that small erasures can be made on drawings or on typewriting, limited in size to that of the opening on the shield.

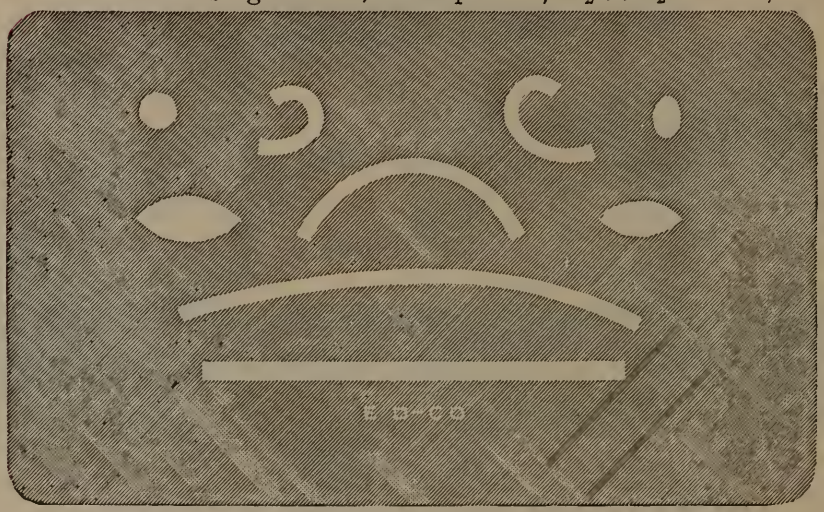
No. 3378.

No. 3378. Metal Erasing Shield, nickel plated, $2\frac{3}{8} \times 3\frac{3}{4}$ inches, . Each, $0 20



No. 3381.

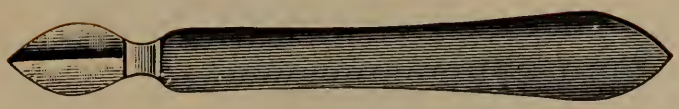
No. 3381. Celluloid Erasing Shield, transparent, $2\frac{1}{2} \times 4\frac{1}{2}$ inches, Each, $0 20



No. 3383.

No. 3383. Celluloid Erasing Shield, transparent, 3×5 inches, . Each, $0 25

STEEL ERASERS



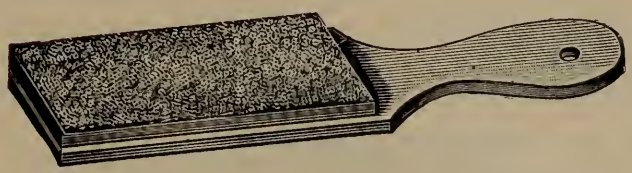
Nos. 3390–3391½.

No. 3390.	Steel Eraser, cocoa handle, Domestic,	Each,	$0 35
3391.	" " white bone handle, Domestic,	"	50
3391½.	" " " " " Imported,	"	75

Nos. 3395-3396½.

No. 3395.	Steel Eraser, cocoa handle, Domestic,	Each,	$0 45
3395½.	" " " " Imported,	"	70
3396.	" " white bone handle, Domestic,	"	60
3396½.	" " " " " Imported,	"	90

PENCIL POINTERS



No. 3416.

No. 3410.	Pencil Pointer, 1¼×4 in.,	Each,	$0 10
3412.	" " 2½×4 "	"	12
3416.	" " 1¼×4 " with handle,	"	15
3417.	" " 2½×4 " " "	"	20

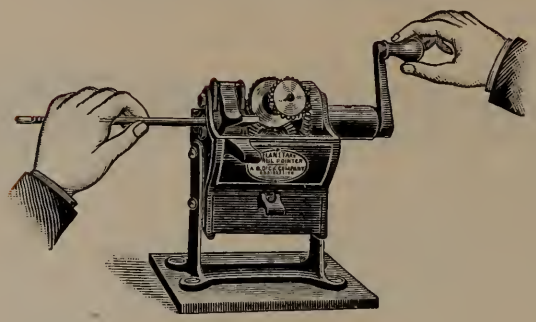
Above Pencil Pointers consist of a number of sheets of flint paper made into a block.

No. 3418.

No. 3418.	Steel Pencil Pointer (File) and Tack Lifter, 7¾ in.,	Each,	$0 25

PENCIL SHARPENERS

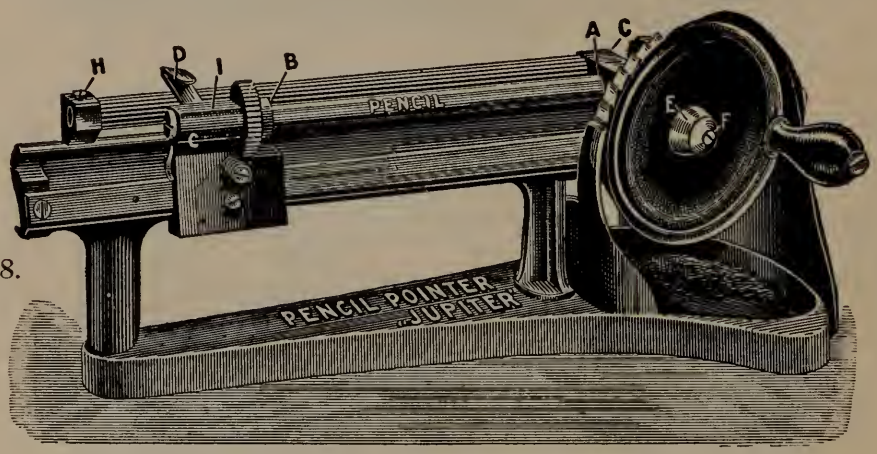
No. 3425.



No. 3425. Planetary Pencil Sharpener, ... Each, $4 50
3426. Extra Knives for Planetary Pencil Sharpener, . . . " 65

The Planetary Pencil Sharpener is made of cast metal, japanned, very durable, and is easily operated, makes a perfect point on any size or kind of pencil; size, 6¼ x 5 x 4½ inches. Full directions with each machine.

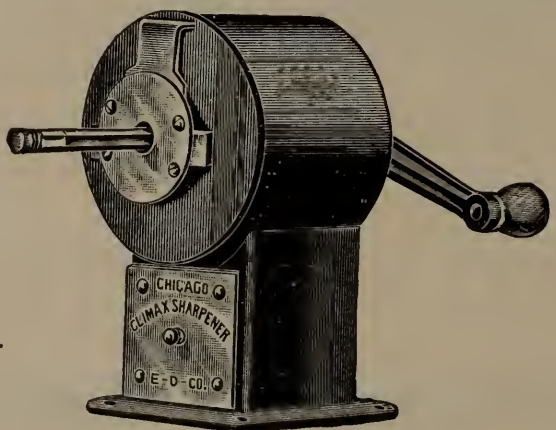
No. 3428.



No. 3428. Jupiter Pencil Sharpener, ... Each, $8 50

The Jupiter Pencil Sharpener is superior to all others in workmanship and the ease with which it can be operated. The cutting-wheel is made reversible, so that when one side becomes dull the other side may be used after which a new cutting-wheel can be supplied or the old one sharpened.

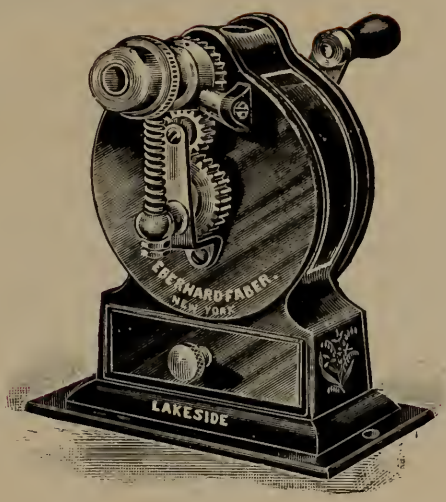
No. 3432.



No. 3432. Climax Pencil Sharpener, ... Each, $6 00

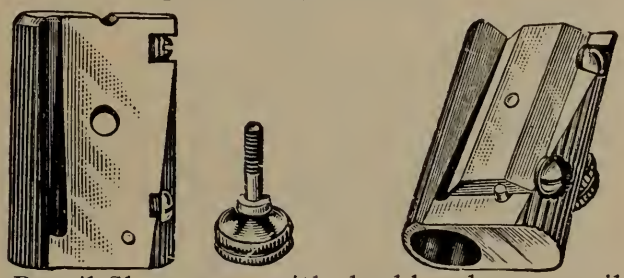
The Climax Pencil Sharpener is made of metal, japanned, of superior construction, easily operated and will not break points The cutter revolves around a common center and the machine can be made to cut faster by turning screw in the crank hub to the right, and slower by turning screw to the left.

PENCIL SHARPENERS *Continued*



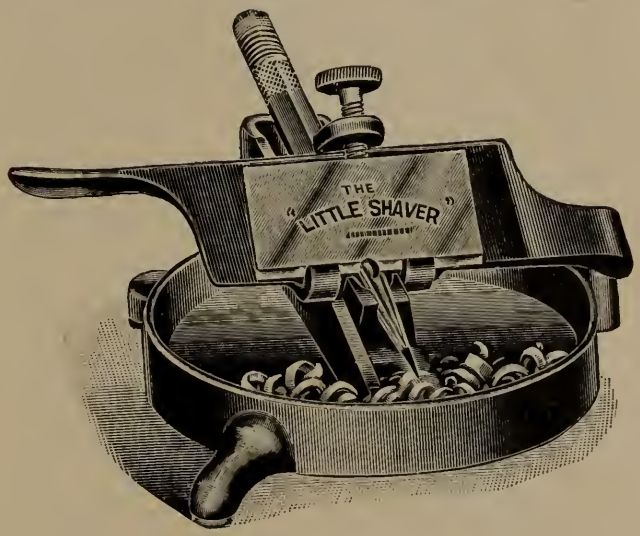
No. 3435.

No. 3435. Lakeside Pencil Sharpener, ... Each, $6 00
The cutter is case hardened steel. It contains an automatic device to hold the pencil firmly in place, requiring but one hand to operate after pencil is inserted. The pencil can be quickly adjusted.



No. 3437.

No. 3437. Acme Pencil Sharpener, with double edge reversible blade, held in place by thumb screw, ... Each, $0 25



No. 3438.

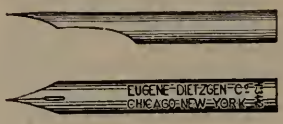
No. 3438. The Little Shaver Pencil Sharpener, ... Each, $1 00
The operation is so easy and natural that it can be used by any one. The cutters are made of the best tool steel obtainable. When dull in one place the cutter may be shifted to a new position, thus using it nearly the entire length, and may be removed and sharpened. The base, which is a receptacle for the chips, rests on rubber tips which will not mar the desk.

E. D. CO.'S STEEL PENS

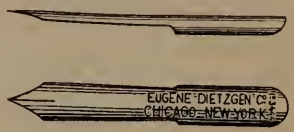
Our Drawing and Lettering Pens, No. 3440 and Crow Quill Pens, No. 3442, were designed especially for draftsmen for drawing and lettering on drawing paper. For these purposes they will be found superior to other makes, as they have longer nibs and less sharp points, and possessing great elasticity, permit of more rapid work without scratching or catching on the grain of the paper.

The Lithographic Pens, No. 3444, are especially made for drawing and lettering on lithographic stones. Having shorter, and consequently firmer nibs, with extra fine points, they are particularly adapted for that class of work.

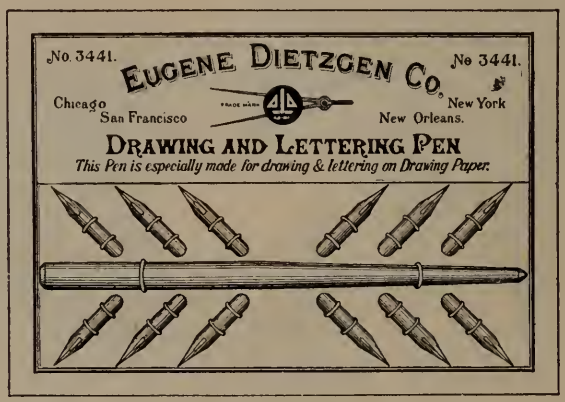
No. 3440.



3442.

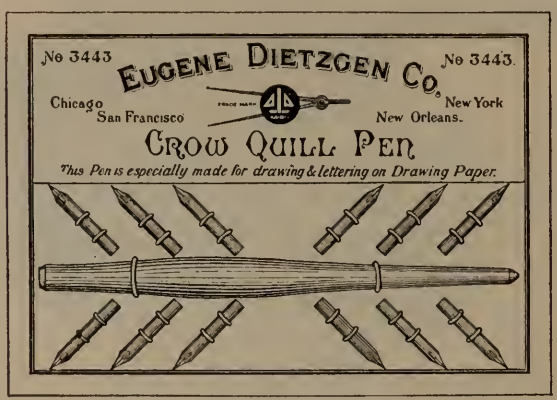


3444.



No. 3441.

No. 3440. E. D. Co.'s Drawing and Lettering Pens, 1 doz. in box, Per doz., $0 50
3441. " " " " " " 1 doz. No. 3440 on a card with holder, ... Per card, 60



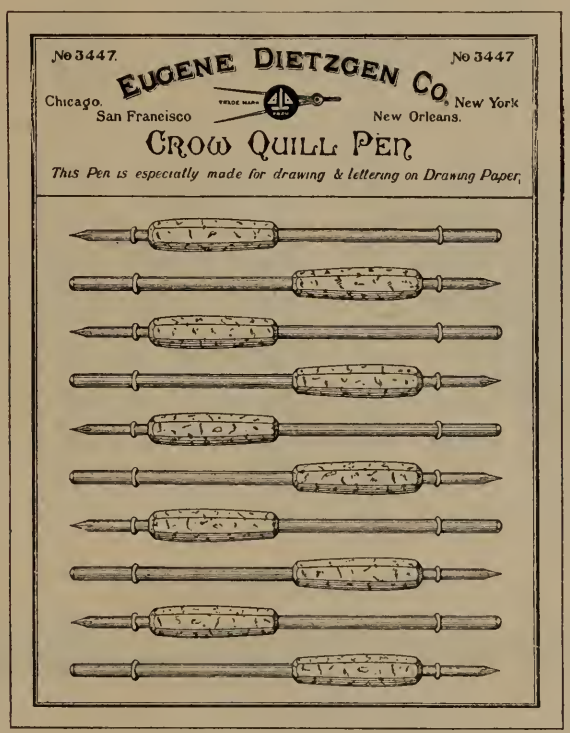
No. 3443.

No. 3442. E. D. Co.'s Crow Quill Pens, 1 doz. in a box, . . Per doz., $0 50
3443. " " " " " 1 doz. No. 3442 on a card with holder, ... Per card, 60

E. D. CO.'S STEEL PENS *Continued*

No. 3445.

No. 3444. E. D. Co.'s Lithographic Pens, 1 doz. in a box, . Per doz., $0 50
3445. " " " " 1 " No. 3444 on a card with holder, ... Per card, 60



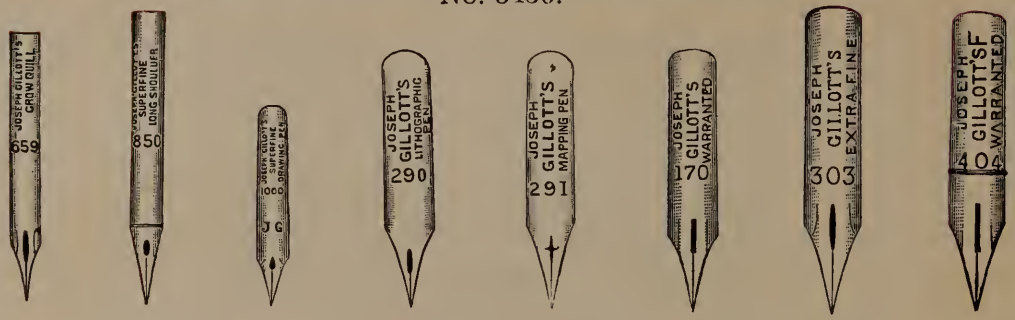
No. 3447.

No 3447. E. D. Co.'s Crow Quill Pens, No. 3442, with improved holder having cork finger piece, 10 pens on card, each with holder.
Per card, ... $1 00
Each, ... 10

STEEL PENS

FOR LETTERING AND DRAWING.

No. 3450.


JOSEPH GILLOTT'S CROW QUILL 659
JOSEPH GILLOTT'S SUPERFINE LONG SHOULDER 850
JOSEPH GILLOTT'S LITHOGRAPHIC PEN 290
JOSEPH GILLOTT'S MAPPING PEN 291
JOSEPH GILLOTT'S WARRANTED 170
JOSEPH GILLOTT'S EXTRA FINE 303
JOSEPH GILLOTT'SF WARRANTED 404

No. 3450. 3451. 3452. 3453. 3454. 3455. 3456. 3457.

			Per Dozen.	Per Gross.
No. 3450.	Gillott's Crow Quill Pens,	(659) on cards with holder,	$0 60	$6 00
3451.	" " " "	(850) Long Shoulder, on cards,	75	7 50
3452.	" Drawing "	(1000) Superfine, on cards, . .	1 10	12 00
3453.	" Lithographic "	(290) on cards, with holder, .	60	6 00
3453½.	" " "	(290) loose, in gross boxes, . .	50	5 00
3454.	" Mapping "	(291) on cards, with holder, .	60	6 00
3454½.	" " "	(291) loose, in gross boxes, . .	50	5 00
3455.	" " "	(170) " " " . .	10	1 00
3456.	" " "	(303) " " " . .	15	1 40
3457.	" " "	(404) " " " . .	10	1 00
3460.	French Crow Quill Pens, on cards, with holders, . .		35	3 60

PENHOLDERS

No. 3470.

No. 3470. Improved Crow Quill Penholder, without pen, . . . Each, $0 05
A holder for Crow Quill Pens of the thickness of an ordinary penholder.

No, 3473

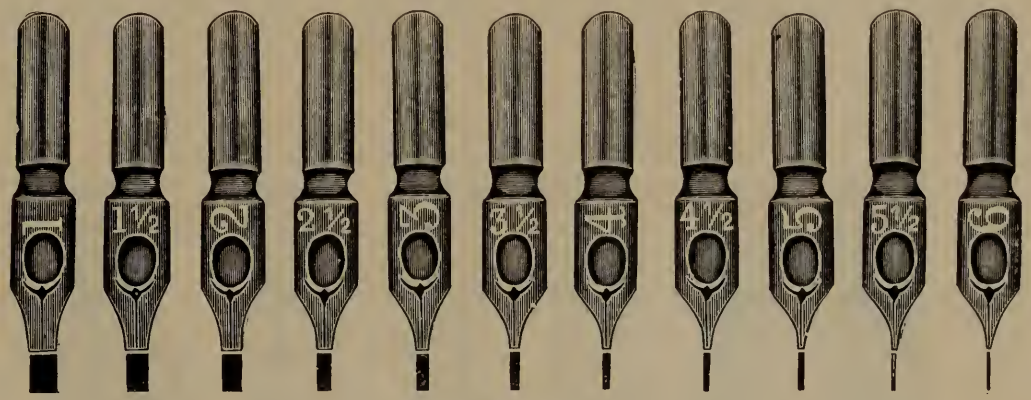
		Each.	Per doz.
No. 3473.	Penholder, polished handle, for Nos. 3453 to 3457,	$0 05	$0 40
3475.	" cork tip, for Nos. 3453 to 3457, . .	05	60

Round Writing

This beautiful style of writing can be easily acquired by self-instruction in a course of ten to twelve hours. Architects, engineers, draughtsmen cannot adopt a finer and more appropriate writing for lettering plans, maps; or other drawings.

Full directions, explaining the system of round writing, giving directions as to how to hold the pen, also examples to copy from, etc., are found in the Methodical Text Book, as listed under No. 3500.

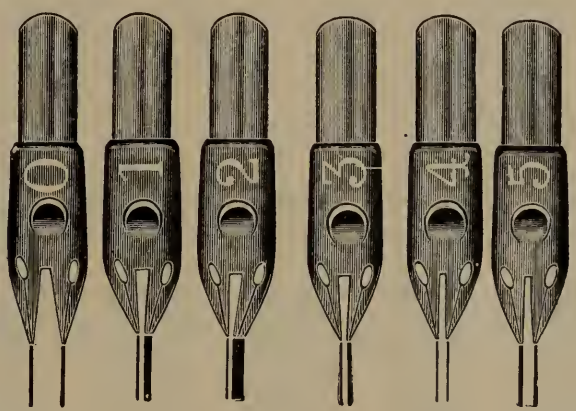
No. 3500. Methodical Text Book to Round Writing, ... Each, $0 75
3501. Round Writing Copy Book, without text, ... " 45



Nos. 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6

Single Pointed Pens, Nos. 3509–3511.

No. 3509. Single Pointed Pens, ... Per ¼ gross of any one size, $0 20
3510. " " " . . . . . Per " " " " " " 70
3511. Assortment of 12 Single Pointed Pens on card, . . Per card, 12



Nos. 0 1 2 3 4 5

Double Pointed Pens, No. 3512.

No. 3512. Assortment of 12 Double Pointed Pens, 6 different kinds, on card with penholder, ... Per card, $0 25
3514. Assortment of Single and Double Pointed Pens, 25 in box, Per box, 40

No. 3515. 3520.

No. 3515. Inkholders for Single or Double Pointed Pens, . . Each, $0 05
3516. " " " " " Per box of 10, 40
3520. Penholder for Round Writing Pens, ... Each, 05

LEONHARDT'S BALL POINTED PENS

No. 3540.

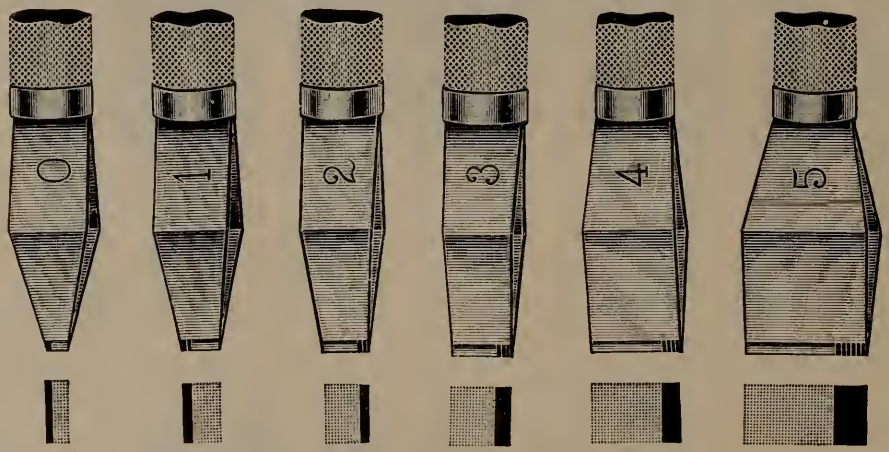
3542.

No. 3544.

3546.

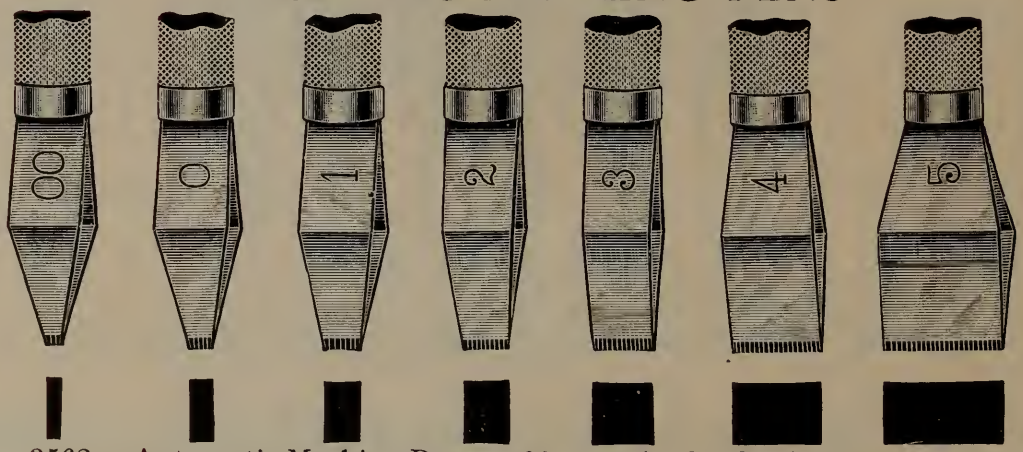
No. 3540.	Leonhardt's Ball Pointed Pens, 506F, . . .	Per gross.	$1 35
3542.	" " " " 506EF, . .	"	1 35
3544.	" " " " 516F, . . .	"	1 35
3546.	" " " " 516EF, . .	"	1 35

AUTOMATIC SHADING PENS



No. 3560. Automatic Shading Pens, 0 1 2 3 4 5
Width of nib, ... $\frac{1}{16}$ $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ in., Each, $0 20

AUTOMATIC MARKING PENS

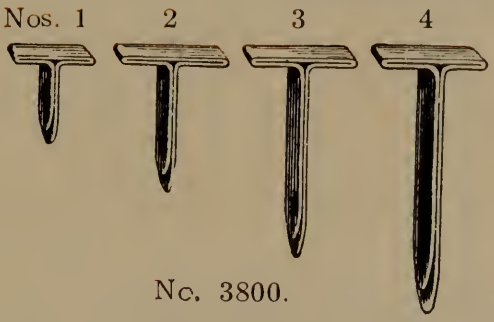


No. 3562. Automatic Marking Pens, 00 0 1 2 3 4 5
Width of nib, ... $\frac{1}{16}$ $\frac{3}{32}$ $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ in., Each, $0 20

No. 3565. Shading and Marking Pen Ink, in colors as follows:
Black, Dark Blue, Green, Purple, Scarlet, Yellow, Orange, Dark Brown, ... Per 1 oz. bottle, 20

For Books on Lettering, Alphabet Books, etc., see Nos. 7500-7518.

PAPER FASTENERS



No. 3800.

3805.

No. 3800.	Paper Fasteners, flat heads.				
	Number,	1	2	3	4
	Length,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1 in.
	Per box of 100,	$0 15	20	25	30
3805.	Paper Fasteners, round heads.				
	Number,	1	2	3	4
	Length,	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1 in.
	Per box of 100,	$0 20	25	30	40

PAPER CLIPS

No. 3810.

3812.

3814.

No. 3810.	Clinch Clip, 250 in box,	Per box,	$0 12
3812.	Weis " 100 " "	"	12
3814.	Gem Clip, 100 " "	"	15

BEST RUBBER BANDS

No. 3820.

No. 3822.

No. 3824.

		Per $\frac{1}{4}$-lb. box.
No. 3820.	Width, $\frac{1}{16}$ in., In lengths as follows: $1\frac{1}{4}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ in.,	$1 00
3822.	" $\frac{1}{8}$ " " " " " $1\frac{1}{4}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3 in.,	1 00
3824.	" $\frac{1}{4}$ " " " " " 2, $2\frac{1}{2}$, 3 in.,	1 00
3827.	Rubber Bands, width $\frac{1}{16}$ in., assorted lengths,	1 00
3828.	" " " $\frac{1}{8}$ " " "	1 00
3829.	" " " $\frac{1}{4}$ " " "	1 00
3830.	" " assorted widths and lengths,	1 00

Prices on Rubber Bands subject to change.

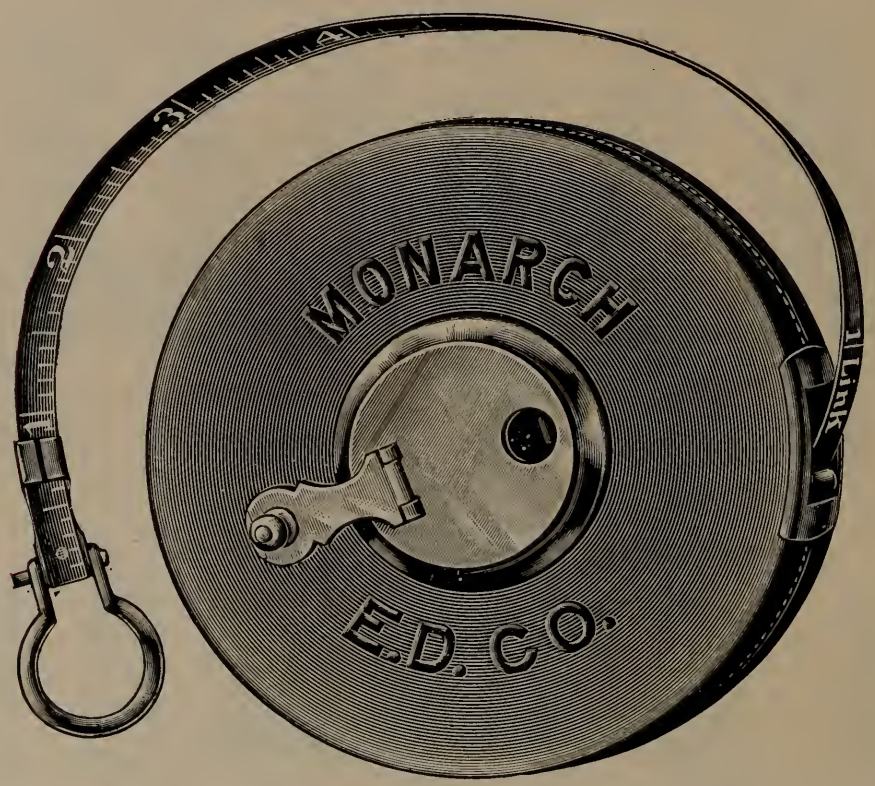
E. D. CO.'S STEEL MEASURING TAPES

We exercise extraordinary care in preparing and graduating our Tapes, and none but the finest grade of steel is used.

The standard of measurement for our full line of Tapes is furnished by the National Bureau of Standards at Washington, and the measurements on all steel tapes are guaranteed as near perfect accuracy as it is possible to make them. Numerous tests made during the last few years show that in comparison with tapes of other manufacture, our goods are the most accurate and reliable , and are recognized as such by the most prominent engineers and surveyors in different parts of the country.

MONARCH

Steel Ribbon ¼ inch wide.



No. 5002.

With hard leather metal lined cases, nickel plated mountings, two detachable rings. The steel is heavier and stronger than used in the regular steel tapes, and the cases are thinner.

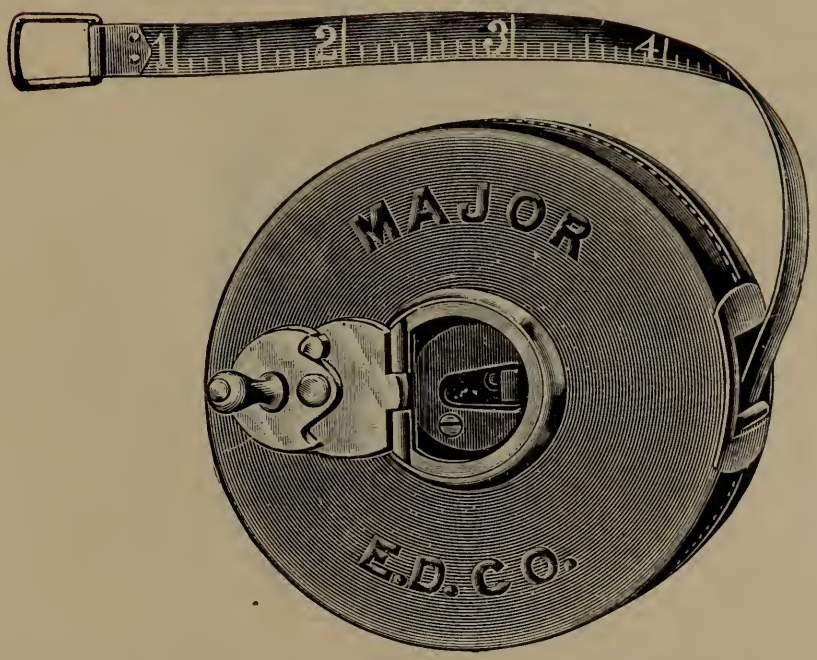
Monarch Steel Tapes, extra fine, Hard Leather Case, steel ribbon ¼ in. wide, flush handle. Graduations begin at end of line.

			Feet, 50	100
No. 5002.	Divided 10ths of feet and links, . .		Each, $7 00	$12 00
5003.	" 12ths " " . .		" 7 00	12 00
			Meters, 15	30
5005.	" Metric and 12ths of feet, . .		Each, 8 50	15 00

STEEL MEASURING TAPES *Continued*

MAJOR

Steel Ribbon 3/8 inch wide.



No. 5015.

Major Steel Tapes, Hard Leather Case, steel ribbon $\frac{3}{8}$ in. wide, double folding flush handle opened by pressing small pin or button on opposite side, nickel-plated mountings. Graduations begin at end of ring.

		Feet,	25	50	75	100
No. 5015.	Divided 10ths of feet and links,	Each,	$4 50	7 25	10 50	13 00
5016.	" 12ths " " "		4 50	7 25	10 50	13 00
		Meters,	10	20	30	
5018.	" Metric (one side only), .	Each,	$5 00	9 00	13 00	
5019.	" " and 12ths of feet,	"	6 00	10 50	15 50	

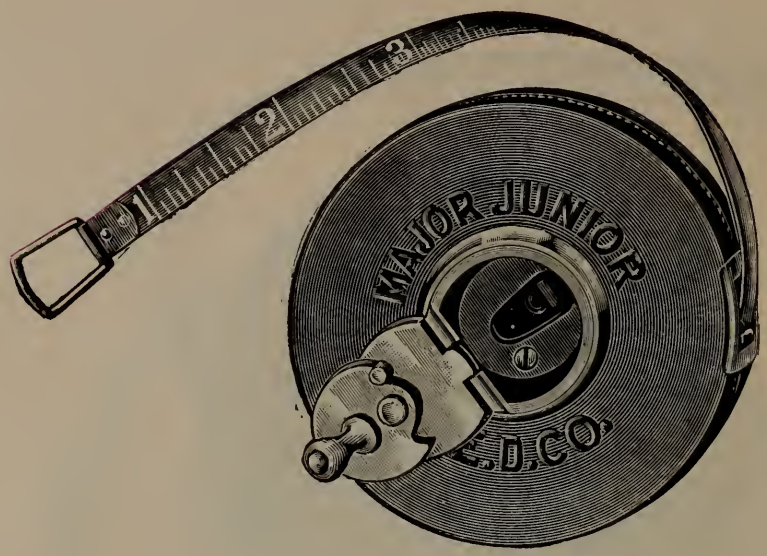
Repairs on Steel Tapes of all kinds promptly attended to at moderate charges.

Tapes of other lengths or divisions made to order.

STEEL MEASURING TAPES *Continued*

MAJOR JUNIOR

Steel Ribbon ¼ inch wide.



No. 5027.

Our Major Junior Steel Tapes have a double folding flush handle, opened by pressing small pin or button on opposite side. A convenient Vest Pocket Steel Tape; 25 ft., weighs only 3 ounces; 50 ft. only 5 ounces, complete.

Major Junior Steel Tapes, Hard Leather Case, steel ribbon ¼ in. wide, double folding flush handle. Graduations begin at end of ring.

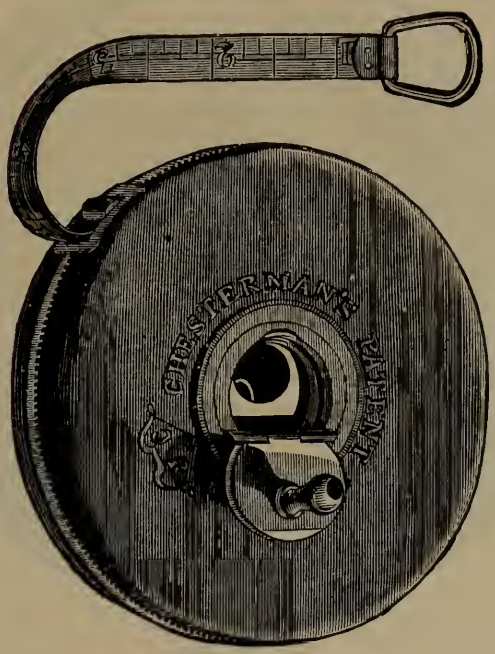
		Feet,	25	50
No. 5026.	Divided 10ths of feet, ...	Each,	$4 00	5 00
5027.	" 12ths "	"	4 00	5 00
		Meters,	10	15
5028.	" Metric (one side only), ...	Each,	$4 50	5 00
5029.	" " and 12ths of feet. . . .	"	5 50	6 50

They are small and light, but constructed in such durable manner, and the steel of sufficient weight, that with proper care it will wear as long as an ordinary steel tape. It is, of course, not designed to replace or do the heavy work of a larger and heavier tape, but for such as have frequent use for a steel tape, and wish to have one constantly with them, this is an article of great value and convenience. Extreme accuracy and the finest construction is guaranteed.

STEEL MEASURING TAPES *Continued*

CHESTERMAN'S

Steel Ribbon 3/8 inch wide.



No. 5032.

Chesterman's Steel Tapes, Red Leather Case, steel ribbon 3/8 in. wide, flush handle. Graduations begin at end of ring.

		Feet,	25	33	50	66	75	100
No. 5031.	Div. 10ths of feet and links,	Each,	$4 50	5 25	7 20	9 20	10 40	12 80
5032.	" 12ths " " "		4 50	5 25	7 20	9 20	10 40	12 80

Repairs on Steel Tapes of all kinds promptly attended to at moderate charges.

Tapes of other lengths or divisions made to order.

STEEL MEASURING TAPES *Continued*

RELIANCE

Steel Ribbon 3/8 inch wide.

No. 5034B.

Reliance Steel Tapes, Hard Leather Case, steel ribbon 3/8 in. wide, flush handle. Graduations begin at end of ring.

		Feet,	25	50	75	100
No. 5034A.	Divided 10ths of feet, . .	Each,	$3 50	4 50	5 75	7 25
5034B.	" 12ths " . . .	"	3 50	4 50	5 75	7 25
		Meters,	15		25	30
5034C	" Metric (one side only), .	Each,	$4 50		6 00	7 25
5034D.	" " and 12ths of feet, .	"	5 75		8 50	10 00

DEFENDER

Steel Ribbon 1/2 inch wide.

Defender Steel Tapes, Hard Leather Case, steel ribbon 1/2 in. wide, flush handle. Graduations begin at end of ring.

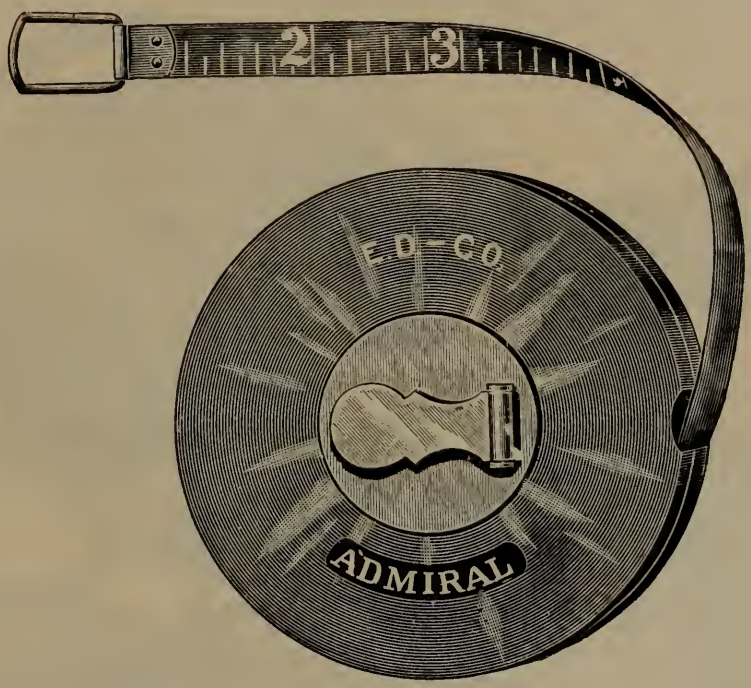
		Feet,	50	100
No. 5035A.	Divided 10ths of feet and links, . . .	Each,	$5 50	9 00
5035B.	" 12ths " " . . .	"	5 50	9 00

The Reliance and Defender Steel Tapes, while comparatively low in price, are strictly first class, durable, and the graduations guaranteed perfectly accurate.

STEEL MEASURING TAPES *Continued*

ADMIRAL

In Nickel Plated Steel Cases. Steel Ribbon 3/8 inch wide.



No. 5037B.

Admiral Steel Tapes, Nickel Plated Steel Case, flush handle, steel ribbon 3/8 in. wide. Graduations begin at end of ring.

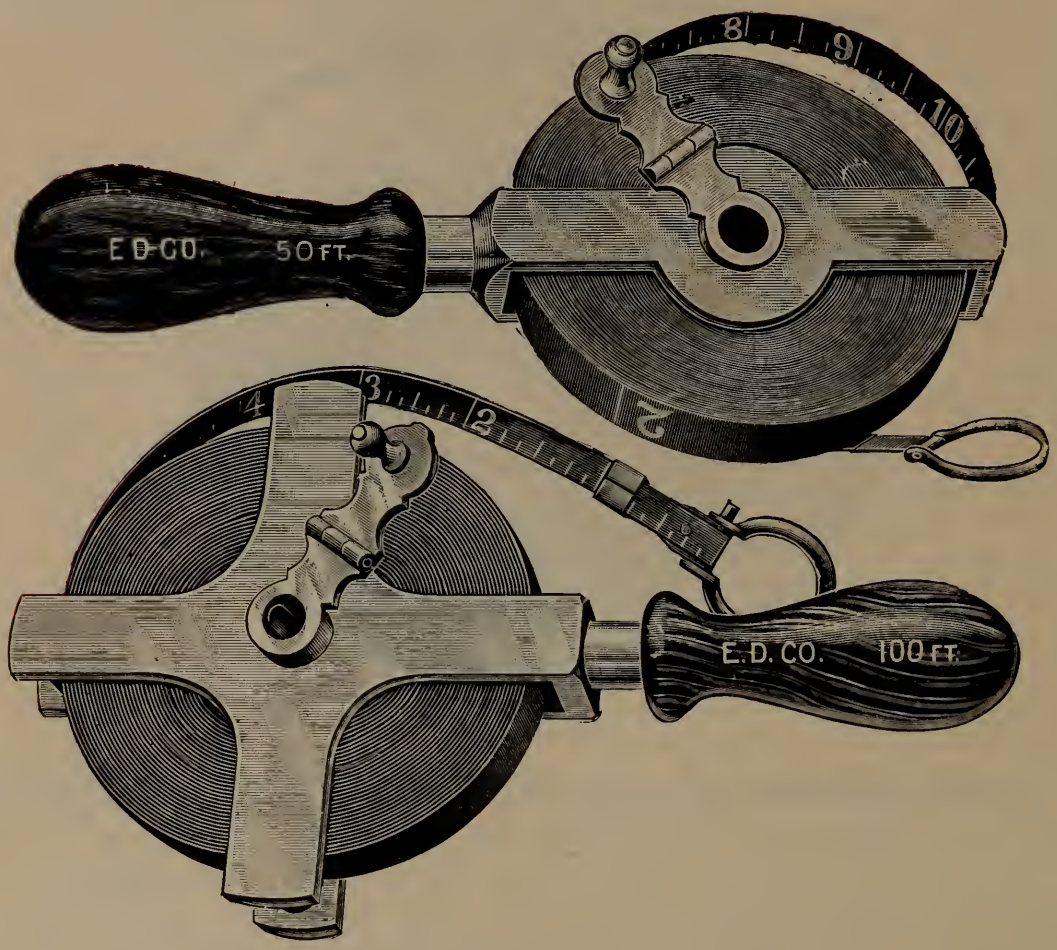
			25	50	75	100
		Feet,				
No. 5037A.	Divided 10ths of feet, . .	Each,	$2 90	3 75	5 00	6 50
5037B.	" 12ths " . .	"	2 90	3 75	5 00	6 50
		Meters,	15	25		30
5037C.	" Metric (one side only), . .	Each,	$3 75	5 75		6 50
5037D.	" " and 12ths of feet, .	"	5 00	8 00		9 00

The Admiral Steel Tapes are manufactured by us to meet the demand for a low-priced steel tape, and are intended to supersede the metallic tapes, which are frequently used when a more reliable tape ought to be employed. The graduations are guaranteed accurate and the nickel plated steel case is compact and very durable.

STEEL MEASURING TAPES *Continued*

CHANCELLOR

Steel Ribbon ¼ inch wide.



No. 5042.

Chancellor Steel Tapes, steel ribbon ¼ in. wide, nickel-plated brass frame and mountings, with folding handle. Two detachable rings. Graduations begin at end of line.

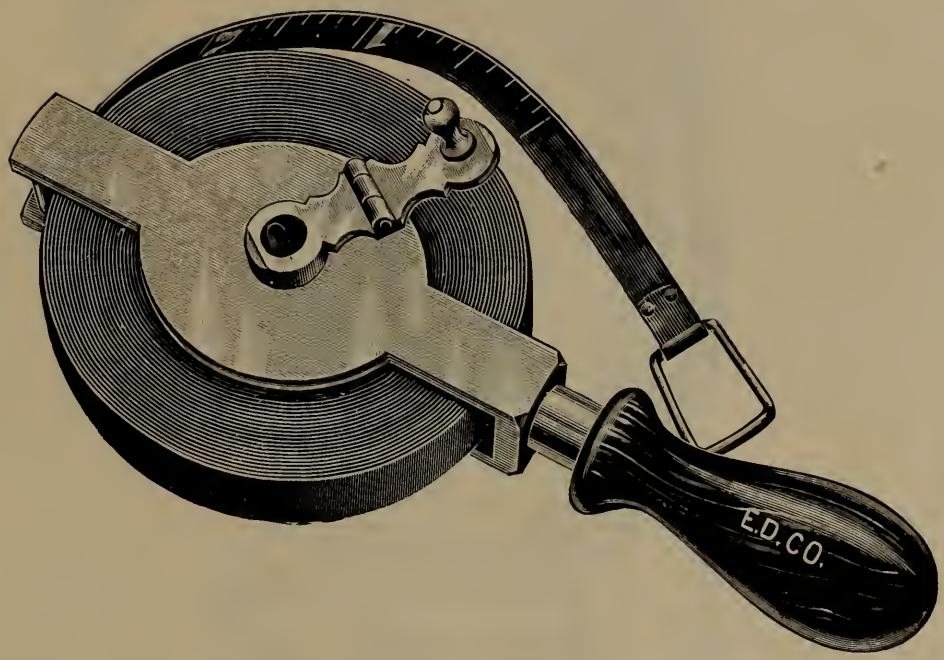
		Feet,	50	100	200
No. 5041.	Divided 10ths of feet and links,	Each,	$6 00	10 00	19 00
5042.	" 12ths " " "		6 00	10 00	19 00
		Meters,	15	30	50
5042C.	" Metric (one side only),	Each,	$6 00	10 00	16 50
5042D.	" " and 12ths of feet,	"	7 25	12 50	19 50

Four-arm frames furnished with above 100 feet, 200 feet, 30 and 50 meter Tapes.

STEEL MEASURING TAPES *Continued*

REGAL

Steel Ribbon 3/8 inch wide.



No. 5043A.

Regal Steel Tapes, steel ribbon $\frac{3}{8}$ in. wide, nickel-plated brass frame and mountings, with folding handle. Two detachable rings. Graduations begin on the line.

		Feet,	50	100	150	200
No. 5043A.	Divided 10ths of feet,	Each,	$5 00	8 50	13 50	17 00
5043B.	" 12ths "	"	5 00	8 50	13 50	17 00

Four-arm frames furnished with above 150 and 200 feet Tapes.

MAJESTIC

Steel Ribbon ½ inch wide.

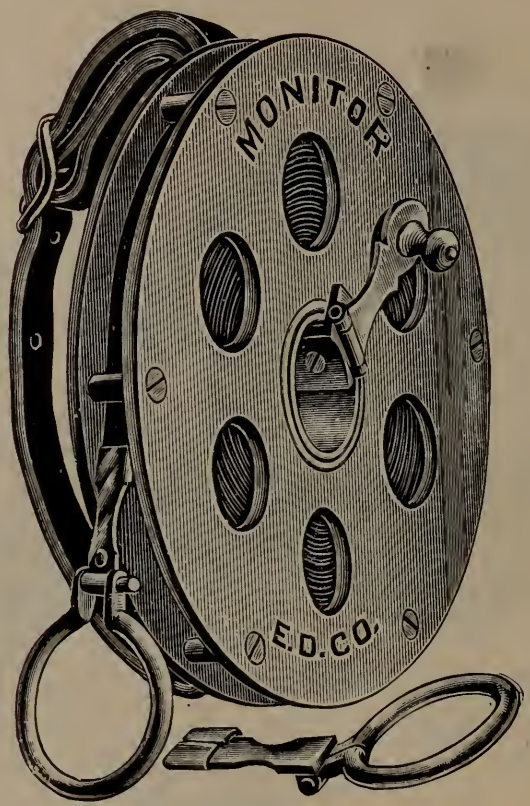
Majestic Steel Tapes, steel ribbon $\frac{1}{2}$ in. wide, nickel-plated brass frame and mountings, with folding handle. Two detachable rings. Graduations begin on the line.

		Feet,	50	100
No. 5044.	Divided 10ths of feet, ...	Each,	$6 00	10 00
5045.	" 12ths "	"	6 00	10 00

STEEL MEASURING TAPES *Continued*

MONITOR

Steel Ribbon ¼ inch wide.



No. 5047.

Monitor Steel Tapes, with metal reel and leather strap handle and two detachable handles for tape line, steel ribbon ¼ in. wide. Graduations begin on the line.

			Feet,	50	100
No. 5047.	Divided 10ths of feet, ...		Each,	$8 00	12 75
			Meters,	15	30
5048.	" Metric (one side only), . . .		Each,	$8 00	12 75

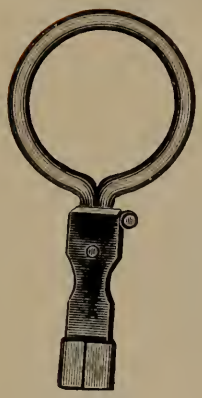
STEEL POCKET TAPES

For Reading Diameter from Circumference.

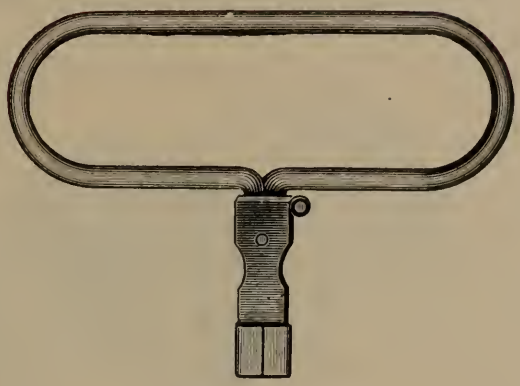
No. 5049. Steel Pocket Tape, German Silver Case, with spring and stop, 12 feet, steel ribbon ¼ in. wide, ... Each, $3 25

This tape is graduated to inches and $\frac{1}{16}$ in. on one side, and on the other side to a scale of 3.1416 in.=1 inch, for computing the diameter. The graduations are numbered from zero up, the one before zero being subdivided into 64 equal parts so that the diameter can be read to inches and $\frac{1}{64}$ inches.

HANDLES FOR STEEL TAPES

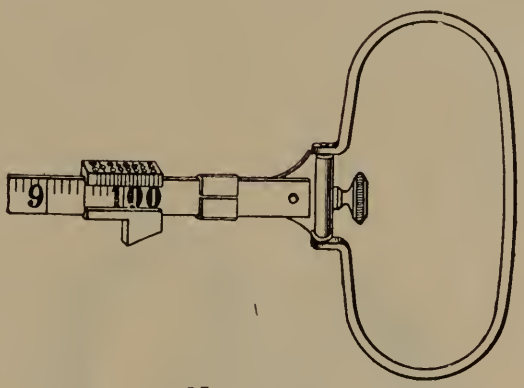


No. 5049A.



No. 5049B.

No. 5049A. Plain Detachable Handles, for ¼ in. tapes. small, 1 in. round, ... Per pair, $0 50
5049B. Plain Detachable Handles, for ¼ in. tapes, large, 3 in. oval, Per pair, ... 1 00

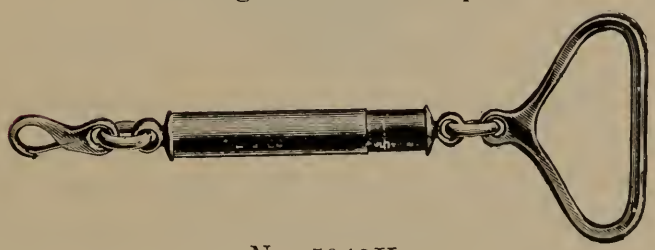


No. 5049F.

No. 5049E. Compensatory Handles for various temperatures, for ¼ in. tapes 50 ft. long, ... Each, $2 00
5049F. Compensatory Handles for various temperatures, for ¼ in. tapes 100 ft. long, ... Each, 2 00

TENSION HANDLES

For Engineer's Steel Tapes.

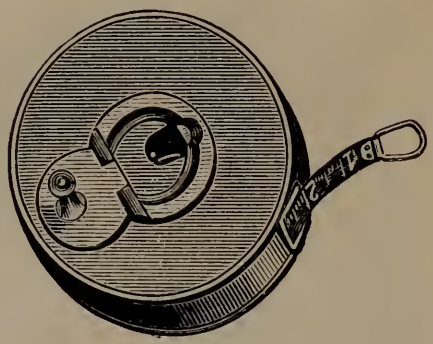


No. 5049K.

No. 5049K. Tension Handle, brass, nickel-plated, indicating tension up to 15 lbs., reading to half pounds, ... Each, $2 50
5049L. Tension Handle, like No. 5049K, but indicating tension up to 25 lbs., reading to half pounds, ... Each, 2 50

MAJOR POCKET TAPES

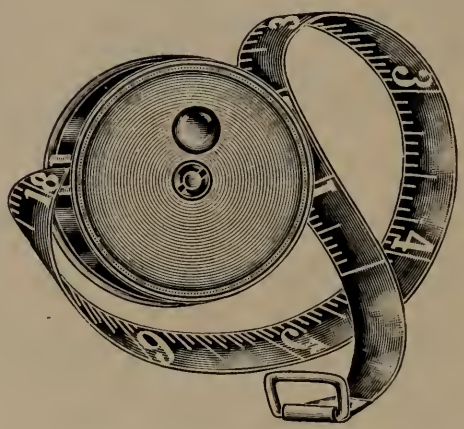
STEEL AND LINEN



Nos. 5050-5052.

Major Steel Pocket Tapes, German silver case, $2\frac{1}{8}$ in. diam., flush handle; neat, compact and very handy; steel ribbon $\frac{5}{16}$ in. wide.

No. 5050.	Divided 10ths of feet, 25 feet long, ...	Each,	$3 60
5051.	" 12ths " 25 " "	"	3 60
5052.	" 10ths and 12ths of feet, 25 feet long, . .	"	4 00



No. 5061.

Major Steel Pocket Tapes, German silver case, with spring and stop; steel ribbon $\frac{1}{4}$ in. wide.

		Feet,	3	5	6	9	12
No. 5061.	Divided $\frac{1}{16}$ in. and metric,	Each,	$1 10	1 40	1 60	2 20	2 80
5062.	" $\frac{1}{100}$ ft. " $\frac{1}{16}$ in.,	"	1 30		1 90		3 00

Major Linen Pocket Tapes, German silver case, with spring and stop.

		Feet,	3	6
No. 5065.	Divided $\frac{1}{16}$ in. and metric, ...	Each,	$0 80	1 05

MIDGET STEEL POCKET TAPES

Nos. 5075-5077.

Midget Steel Pocket Tapes, nickel-plated brass case, spring wind with center stop, steel ribbon $\frac{1}{4}$ in. wide.

		Inches,	36	60	72	96
No. 5075.	Divided $\frac{1}{16}$ in. (one side), . .	Each,	$0 70	90	1 00	1 50
5077.	" $\frac{1}{16}$ " and metric (both sides),	Meters,	1	$1\frac{1}{2}$	2	
	Each, ...		$0 80	1 10	1 20	

IDEAL STEEL POCKET TAPES

LEATHER CASES.

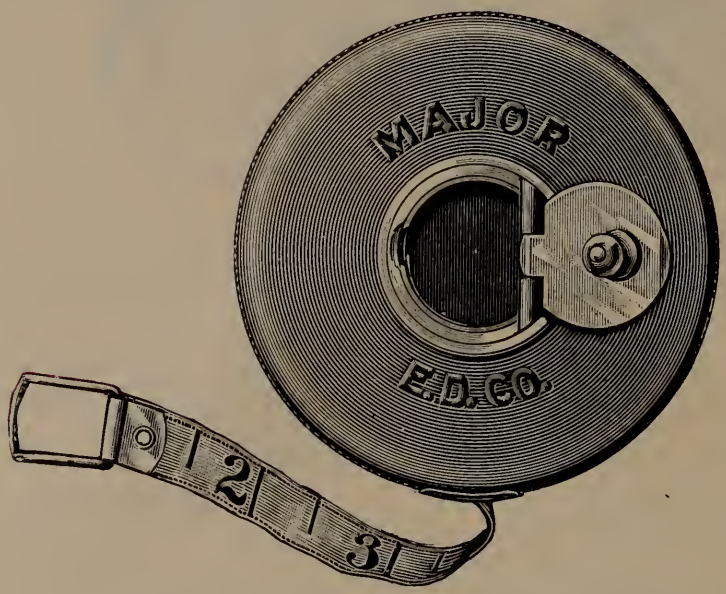
No. 5080.

Ideal Steel Pocket Tapes, best quality Leather Case, metal lined, spring wind with center stop, silver plated mountings, steel ribbon $\frac{1}{4}$ in. wide.

No. 5080.	Divided $\frac{1}{16}$ in. (one side), 60 in. long, ...	Each,	$1 75
5082.	" $\frac{1}{16}$ " and $\frac{1}{100}$ ft. (both sides), 60 in. long,	"	2 00
5084.	Divided $\frac{1}{16}$ in. and metric (both sides), 60 in. long, .	"	2 00

E. D. CO.'S METALLIC MEASURING TAPES

These Tapes are made of linen thread, interwoven with fine brass wire, and are not so liable to stretch as the ordinary linen tape, and better calculated to withstand the effect of moisture. **Where exact measurements are required, only Steel Tapes should be used.**



No. 5120.

Major Metallic Tapes, Red Leather Case, $\frac{5}{8}$ in. wide. Best wire woven or metallic, flush handle, leather end. Graduations begin at end of ring.

			Feet,	50	100
No. 5120.	Divided	10ths of feet and links, ...	Each,	$2 30	3 80
5121.	"	12ths " "	"	2 30	3 80
			Meters,	15	30
5122C.	"	Metric (one side only), ...	Each,	$2 30	3 80
5122D.	"	" and 12ths of feet, . . .	"	2 40	4 00

Major Metallic Tapes, *without case.*

			Feet,	50	100
No. 5123.	Divided	10ths of feet and links, ...	Each,	$1 35	2 60
5124.	"	12ths " "	"	1 35	2 60
			Meters,	15	30
5125.	"	Metric (one side only), ...	Each,	$1 20	2 40
5126.	"	" and 12ths of feet, . . .	"	1 35	2 60

ALL LINEN MEASURING TAPES

Major All-Linen Tapes, Red Leather Case, $\frac{5}{8}$ in. wide, flush handle, leather end. Graduations begin at end of ring.

			Feet,	50	100
No. 5127.	Divided	10ths of feet and links, ...	Each,	$2 75	4 50
5128.	"	12ths " "	"	2 75	4 50

METALLIC MEASURING TAPES *Continued*

COLUMBIA

No. 5130A.

Columbia Metallic Tapes, Hard Leather Case, $\frac{5}{8}$ in. wide, wire woven or metallic, folding handle, leather end. Graduations begin at end of ring.

		Feet,	25	50	75	100
No. 5130A.	Divided 10ths of feet and links,	Each,	$1 80	2 60	3 30	4 20
5130B.	" 12ths " " "		1 80	2 60	3 30	4 20

Columbia Metallic Tapes, *without case.*

		Feet,	25	50	75	100
No. 5130C.	Divided 10ths of feet and links,	Each,	$1 00	1 50	2 00	2 90
5130D.	" 12ths " " "		1 00	1 50	2 00	2 90

METALLIC MEASURING TAPES *Continued*

CHESTERMAN'S

No. 5131.

Chesterman's Metallic Tapes, Red Leather Case, $\frac{5}{8}$ in. wide, wire woven or metallic, folding handle. Graduations begin at end of ring.

		Feet,	25	33	50	66	75	100
No. 5131.	Div. 10ths of feet and links,	Each,	$1 80	2 10	2 60	3 00	3 30	4 20
5132.	" 12ths " " "		1 80	2 10	2 60	3 00	3 30	4 20

Chesterman's Metallic Tapes, *without case.*

		Feet,	25	50	66	100
No. 5141.	Divided 10ths of feet and links,	Each,	$1 00	1 50	2 00	2 90
5142.	" 12ths " "	"	1 00	1 50	2 00	2 90

E. D. CO.'S FLAT STEEL WIRE TAPES

FOR CITY, BRIDGE, MINE AND RAILROAD ENGINEERING

These Tapes are made of the finest quality of flexible steel ribbon ⅛ in. wide, carefully tempered to prevent breaking or kinking. We make these Tapes regularly from 100 feet up to 500 feet in length, but can also furnish them up to 1,000 feet if desired. We are also prepared to furnish these Tapes with steel ribbon about $\frac{1}{10}$ in. wide if so ordered, at the same prices as for the corresponding ⅛ in. Tapes. Each Tape is provided with two nickel-plated detachable handles.

They are graduated under a strain of ten pounds avoirdupois, supported throughout, and compare accurately with the Government Standard at 62° Fahrenheit.

Our Flat Steel Wire Tapes are made in two styles: Nos. 5400 to 5424 are of ⅛ in. black steel ribbon, graduated on *clamped brass sleeves* which are notched exactly opposite the graduation mark. Nos. 5430 to 5454 are made of ⅛ in. steel ribbon, *heavily plated with white metal* (to resist rust), and are graduated on *tubular brass sleeves* carefully spaced and soldered. This method of fastening prevents corrosion. The ends of both style sleeves are beveled to facilitate dragging the Tape through brush, grass, etc. without catching.

These Tapes are guaranteed to be of correct length, but parties desiring to have them verified can have this done by sending the Tape to the National Bureau of Standards, Washington, D. C. The Bureau's fee for comparing the total length not greater than 100 feet is 75 cents, and for each intermediate division compared an additional charge of 10 cents is made. Transportation charges to Washington must be prepaid.

Flat Steel Wire Tapes graduated in Links, Varas, or other measure furnished to order on short notice.

Reels are listed separately (see Nos. 5475-5485) and are not included in the prices of these Tapes.

Graduations on clamped brass sleeves.

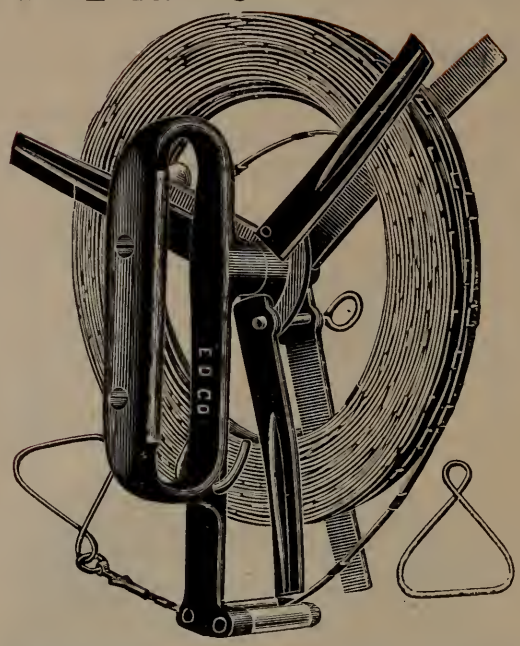
Flat Steel Wire Tapes, black ribbon 1/8 ***in. wide, graduated on clamped brass sleeves,*** with 2 nickel-plated detachable handles.

			Without Reel Each
No. 5400.	100 feet,	graduated every foot, end feet in 10ths, . . .	$ 7 50
5401.	200 "	" " " " " " "	13 00
5404.	200 "	graduated every 5 ft., end 5 ft. every ft., end ft. in 10ths,	9 00
5405.	300 "	" " 5 " " 5 " " " "	12 00
5406.	400 "	" " 5 " " 5 " " " "	15 00
5407.	500 "	" " 5 " " 5 " " " "	18 00
5410.	200 "	graduated every 10 ft., end 10 ft. every ft., end ft. in 10ths,	7 00
5411.	300 "	" " 10 " " 10 " " " "	9 00
5412.	400 "	" " 10 " " 10 " " " "	11 00
5413.	500 "	" " 10 " " 10 " " " "	13 00
5415.	200 "	graduated every 25 feet, end 25 feet to 5 feet, end 5 feet every foot, end feet in 10ths, . . .	6 50
5416.	300 "	" " like No. 5415, ...	8 00
5417.	400 "	" " " " 5415, ...	9 50
5418.	500 "	" " " " 5415, ...	11 00
5420.	30 meters,	graduated every meter, end meters to decimeters,	7 00
5422.	50 "	" " " " " " " "	10 50
5424.	100 "	" " " " " " " "	17 50

Reels for above Tapes listed under Nos. 5475-5485.

FLAT STEEL WIRE TAPES

Continued



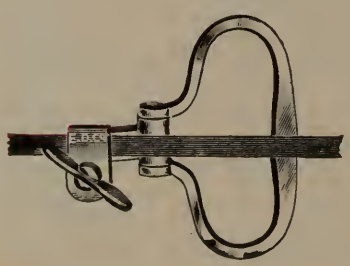
No. 5430 Tape with No. 5480 Reel.

Graduations on tubular brass sleeves.

Flat Steel Wire Tapes, steel ribbon 1/8 *in. wide, heavily plated with white metal* (to resist rust), *graduated on tubular brass sleeves* carefully soldered, with 2 nickel-plated detachable handles.

			Without Reel Each
No. 5430.	100	feet, graduated every foot, end feet in 10ths,	$12 50
5431.	200	" " " " " " " " " "	24 00
5434.	200	" graduated every 5 ft., end 5 ft. every ft., end feet in 10ths,	17 00
5435.	300	" " " 5 " " 5 " " " "	23 00
5436.	400	" " " 5 " " 5 " " " "	28 50
5437.	500	" " " 5 " " 5 " " " "	34 00
5440.	200	" graduated every 10 ft., end 10 ft. every ft., end ft. in 10ths,	13 00
5441.	300	" " " 10 " " 10 " " " "	16 50
5442.	400	" " " 10 " " 10 " " " "	20 00
5443.	500	" " " 10 " " 10 " " " "	23 50
5445.	200	" graduated every 25 feet, end 25 feet to 5 feet, end 5 feet every foot, end feet in 10ths,	11 00
5446.	300	" " like No. 5445,	13 50
5447.	400	" " " " 5445,	16 00
5448.	500	" " " " 5445,	18 50
5450.	30	meters, graduated every meter, end meters to decimeters,	12 00
5452.	50	" " " " " " " "	18 00
5454.	100	" " " " " " " "	32 50

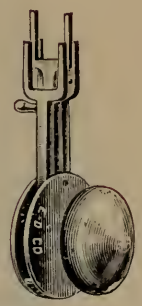
Reels for above Tapes, listed under Nos. 5475-5485.



No. 5470. Clamping Handle, for narrow tapes, to attach to any part of tape, of brass, nickel-plated, ... Each, $0 75

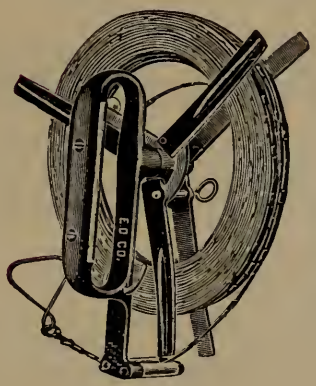
REELS FOR FLAT WIRE AND CHAIN TAPES

No. 5475.



5475 (Folded).

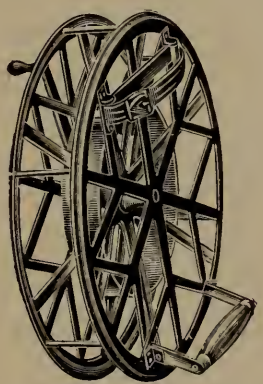
No. 5475. Folding Brass Reel, for tapes 100 ft. long, . . . Each, $2 00
5477. " " " " " 200 to 300 ft. long, . " 3 50



No. 5480.

5480 (Folded).

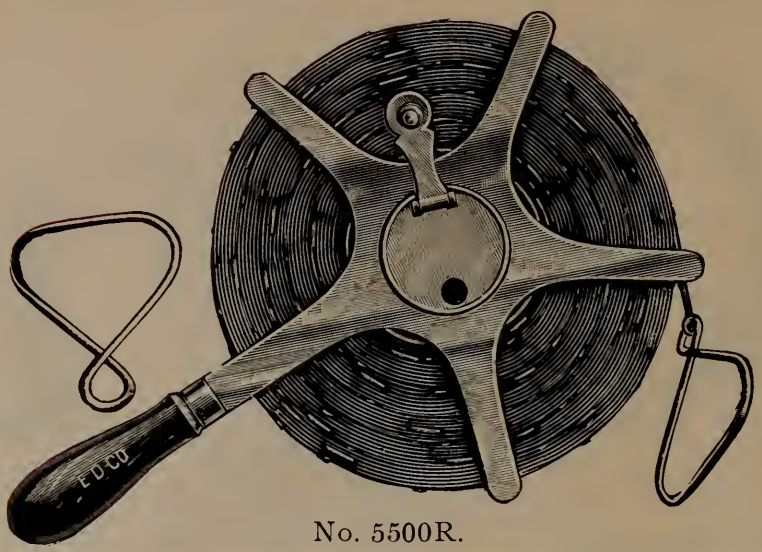
No. 5480. Folding Brass Reel, for tapes 100 to 300 ft. long. . Each, $4 50
5481. " " " like No. 5480, but for tapes 400 to 500 ft. long, ... Each, 5 00



No. 5483.

No. 5483. Improved Phosphor Bronze Reel, with grip handle and leather strap to fit around arm of chainman, for tapes 200 to 500 ft. long. Friction brake and stop to hold tape at any point. Especially adapted for railroad and bridge work; weight about 4 pounds, ... Each, $11 00
5485. Improved Reel, like No. 5483, but made of aluminum, " 13 50

PREMIER STEEL CHAIN TAPES



No. 5500R.

205 400

Graduations on Premier Chain Tapes.

These Chain Tapes are made of superior polished steel, about 1/4 *in. wide, graduated every foot by a brass rivet,* end feet in 10ths and the number of feet are stamped on brass plates every 5 feet.

The Metric Tapes are graduated by rivets every quarter-meter, end meters in decimeters, and are numbered at every meter.

Each tape is provided with a pair of round detachable Metal Handles, or Rawhide Handles will be furnished if desired. The reel is of very substantial construction, made of brass, nickel-plated, with polished wooden handle. For country, field and town work these tapes have given excellent satisfaction. They can be dragged through woodland, brush, etc., and the plated tapes resist rusting better.

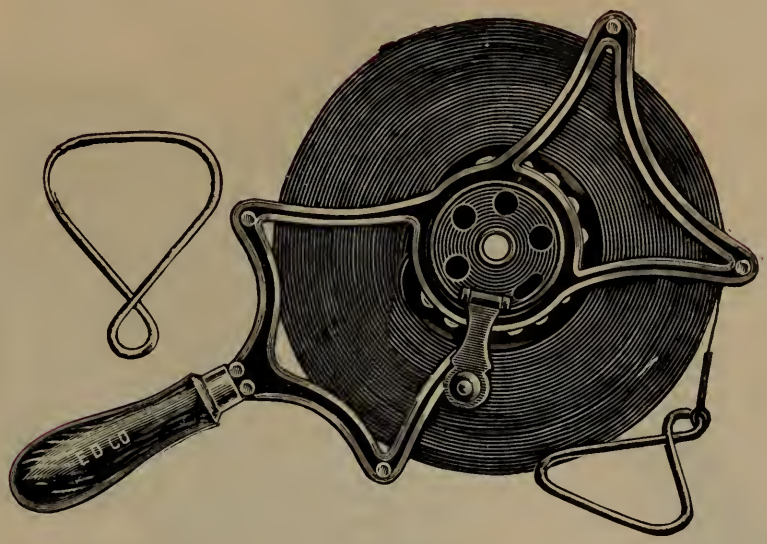
Plain Blued Steel Ribbon, ¼ in. wide.

No. 5500N.	100 feet long, without reel,	Each,	$3 00
5500R.	100 " " with reel No. 5528,	"	5 00
5503N.	200 " " without reel,	"	5 00
5503R.	200 " " with folding reel No. 5480,	"	9 50
5505N.	100 links " without reel,	"	3 00
5505R.	100 " " with reel No. 5528,	"	5 00

Plated Steel Ribbon, ¼ in. wide.

No. 5511N.	100 feet long, without reel,	Each,	$ 4 00
5511R.	100 " " with reel No. 5528,	"	6 00
5517N.	200 " " without reel,	"	6 00
5517R.	200 " " with folding reel No. 5480,	"	10 50
5519N.	300 " " without reel,	"	8 00
5519R.	300 " " with folding reel No. 5480,	"	12 50
5520N.	100 links " without reel,	"	4 00
5520R.	100 " " with reel No. 5528,	"	6 00
5522N.	30 meters " without reel,	"	4 00
5522R.	30 " " with reel No. 5528,	"	6 00
5523N.	50 " " without reel,	"	5 00
5523R.	50 " " with folding reel No. 5480,	"	9 50
5524.	Plain Detachable Metal Handles,	Per pair,	35
5526.	Rawhide Handles,	" "	25
5528.	Reel only,	Each,	2 00

INDESTRUCTIBLE STEEL CHAIN TAPES



No. 5531.

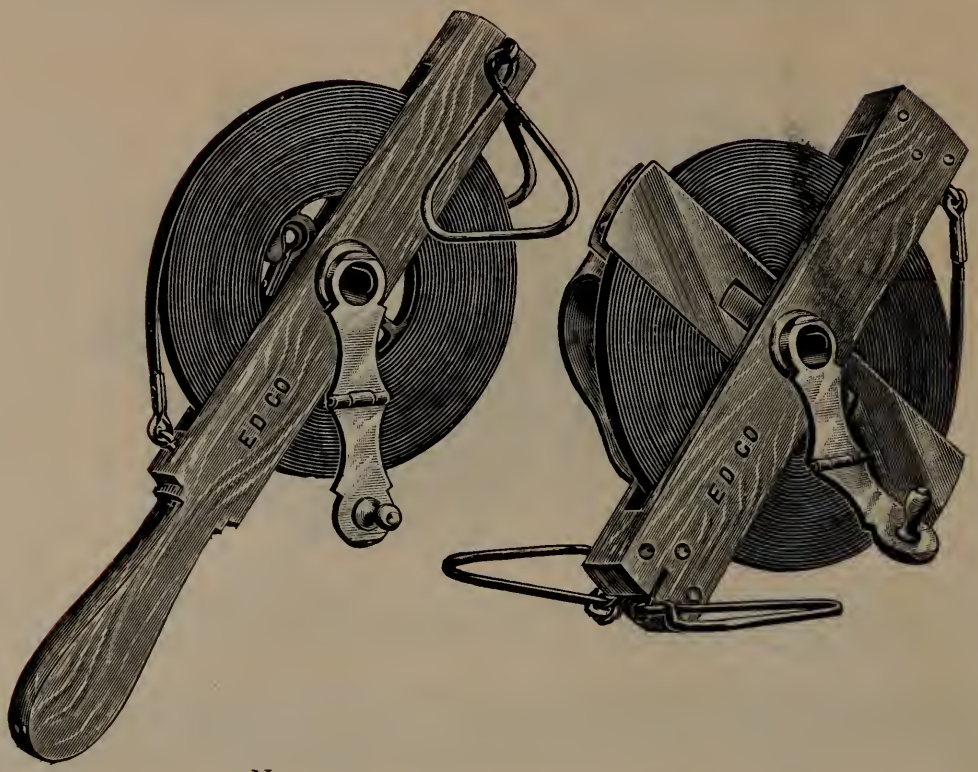
Graduations on Indestructible Chain Tapes.

These Chain Tapes are made of extra tough material, the steel ribbon being about 5/16 ***in. wide*** and somewhat heavier than the ordinary Chain Tapes. They are ***graduated and numbered at every foot on Babbitt Metal,*** end feet in 10ths, and are plated with white metal to resist rust. The Metric Tapes are graduated every quarter-meter, end meters in decimeters.

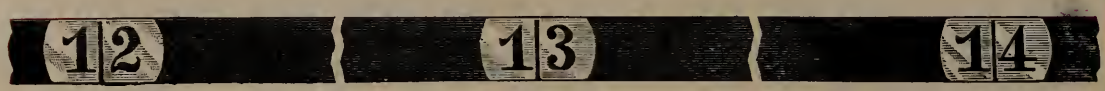
On account of the unusual dimensions of this Tape it requires intentional carelessness to break or permanently bend it. They are well adapted for use in mines, and on rough ground the divisions are less liable to injury than rivets or plates. Each Tape is provided with a pair of round detachable metal handles, or rawhide handles will be furnished if desired. The plain Reel is made of brass, of very substantial construction, with polished wooden handle.

No. 5530.	100 feet long, without reel,	Each,	$ 4 25
5531.	100 " " with plain reel No. 5543,	"	6 00
5532.	200 " " without reel,	"	6 50
5533.	200 " " with folding reel No. 5480,	"	11 00
5534.	300 " " without reel,	"	8 75
5535.	300 " " with folding reel No. 5480,	"	13 25
5537.	30 meters long, without reel,	"	4 25
5538.	30 " " with plain reel No. 5543,	"	6 00
5539.	50 " " without reel,	"	5 50
5540.	50 " " with folding reel No. 5480,	"	10 00
5543.	Plain Reel only,	"	1 75

EMPIRE STEEL CHAIN TAPES



No. 5561. 5565.



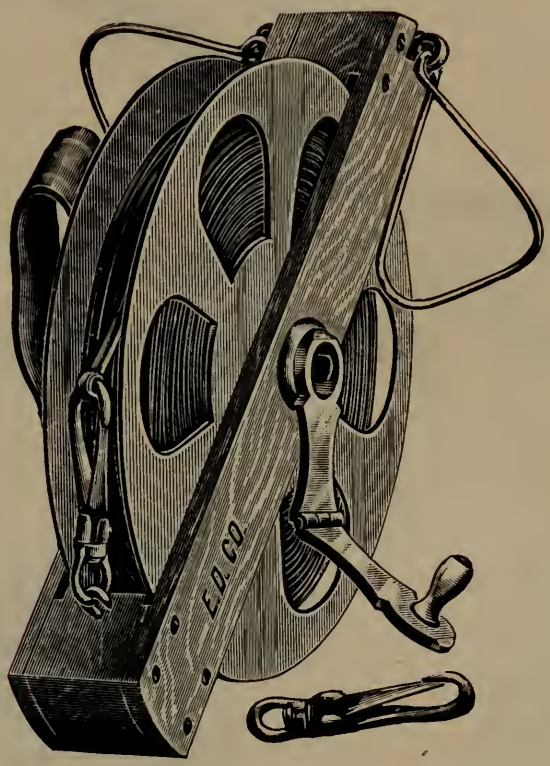
Graduations on $\frac{1}{4}$ in. Empire Chain Tapes.

These Tapes are made of best quality of tempered steel, about 1/4 ***in. wide,*** with ***etched graduations at every foot,*** end feet in 10ths. Each tape is provided with two detachable metal handles, and is furnished with or without reel, as desired.

The plain Reel is made of hardwood, with large metal folding handle, nickel-plated trimmings. The folding Reel has steel cross-arms and a strong leather loop fastened to one side of the frame for holding. When tape is in use and removed from the reel, the metal cross-arms of the reel can be folded into the wooden frame, so that even the large sizes can be conveniently carried in the pocket.

No. 5560.	100 feet long,	without reel,	Each, $ 4 50
5561.	100 " "	with plain reel No. 5574,	" 7 00
5562.	100 " "	" folding reel No. 5578,	" 8 50
5563.	200 " "	without reel,	" 7 50
5564.	200 " "	with plain reel No. 5574,	" 10 00
5565.	200 " "	" folding reel No. 5578,	" 11 50
5566.	300 " "	without reel,	" 11 00
5567.	300 " "	with folding reel No. 5578,	" 15 00
5568.	500 " "	without reel,	" 19 00
5569.	500 " "	with folding reel No. 5578,	" 23 00
5570A.	100 links "	without reel,	" 3 50
5570B.	100 " "	with plain reel No. 5574,	" 6 00
5574.	Plain Reel only,		" 2 50
5578.	Folding Reel only,		" 4 00
5579.	Plain detachable metal Handles,		Per pair, 50

EMPIRE STEEL CHAIN TAPES *Continued*



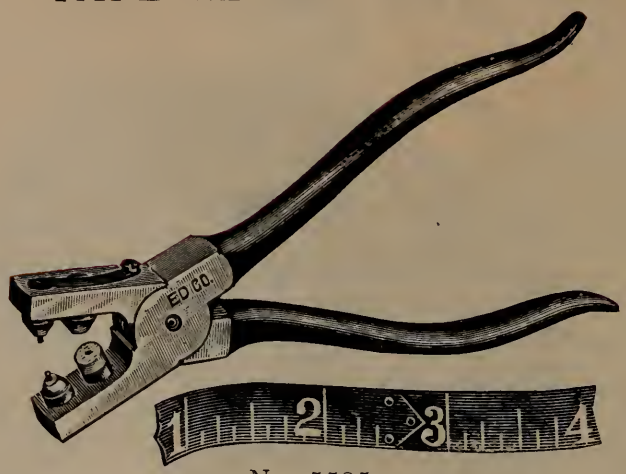
No. 5580B.

Graduations on $\frac{1}{8}$ in. Empire Chain Tapes.

Made of best quality heavy steel 1/8 ***in. wide,*** with ***etched graduations at every foot,*** end feet in 10ths. Each Tape is provided with two detachable metal handles. The Reel is of substantial sheet steel with hardwood frame and metal folding handle. One side of frame is provided with a large and convenient leather loop for holding.

No. 5580A.	100 feet long, without reel,	Each, $	4 50
5580B.	100 " " with reel No. 5584,	"	8 50
5581A.	200 " " without reel,	"	7 50
5581B.	200 " " with reel No. 5584,	"	11 50
5582A.	300 " " without reel,	"	11 00
5582B.	300 " " with reel No. 5584,	"	15 00
5583A.	500 " " without reel,	"	19 00
5583B.	500 " " with reel No. 5584,	"	23 00
5584.	Reel only,	"	4 00

TAPE REPAIR OUTFITS



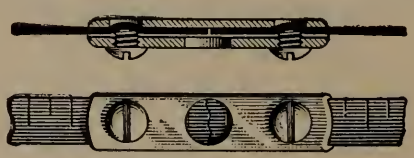
No. 5585

No. 5585. Punch and Riveter Outfit, complete, ... Each, $5 00
5586. Extra Eyelets, 1,000 in package, two lengths, Per package, 1 25

No. 5590.

5592.

No. 5590. Tape Repair Outfit, consisting of block and punch, rivets and piece of steel ribbon, ... Each, $2 50
5592. Tape Repair Outfit, consisting of block and punch, hammer, cutting nippers, taper file, shears, and piece of steel ribbon, in sewed Leather Case with shoulder strap and pocket containing rivets and metal sleeves for flat wire tapes, Each, 9 00

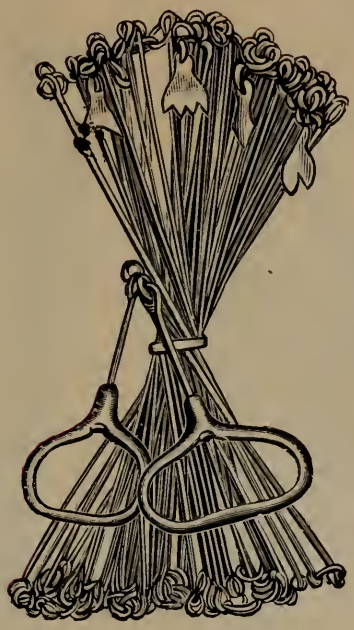


No. 5595.

No. 5595. Little Giant Tape Splice, for $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ in. Tapes, . Each, $0 35

To repair breaks, insert broken ends; adjust by sight hole and turn down screws. Will not catch on obstructions and will withstand the strongest pull. In ordering, please mention size wanted.

MEASURING CHAINS



No. 5603.

Of Steel, U. S. Standard.

			Each.
No. 5600.	Steel, 33 feet, W. G.	12, brazed links and rings, brass handles,	$ 5 50
5601.	" 50 " "	12, " " " " "	6 00
5602.	" 66 " "	12, " " " " "	10 00
5603.	" 100 " "	12, " " " " "	11 00
5610.	" 33 " "	12, oval rings, brass handles,	3 50
5611.	" 50 " "	12, " " " "	4 50
5612.	" 66 " "	12, " " " "	6 50
5613.	" 100 " "	12, " " " "	8 00

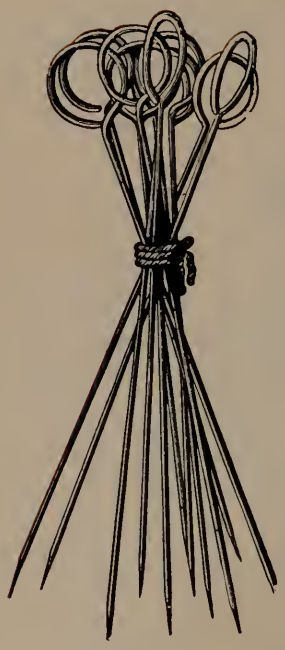
Of Steel, Meter and Vara.

			Each.
No. 5620.	Steel, 10 meter, W. G.	12, brazed links and rings, brass h'dles,	$5 50
5621.	" 15 " "	12, " " " " "	7 50
5622.	" 20 " "	12, " " " " "	10 00
5623.	" 25 " "	12, " " " " "	12 50
5625.	" 10 " "	12, oval rings, brass handles,	3 50
5626.	" 15 " "	12, " " " "	5 00
5627.	" 20 " "	12, " " " "	6 20
5628A.	" 10 varas,	12, brazed links and rings, brass h'dles,	5 50
5628B.	" 20 " "	12 " " " " "	10 00
5629A.	" 10 " "	12, oval rings, brass handles,	3 50
5629B.	" 20 " "	12 " " " " "	6 50

Of Iron, U. S. Standard.

No. 5630.	Iron, 50 feet, W. G.	8, oval rings, brass handles, Each,	$3 50
5632.	" 100 " "	8, " " " " "	5 50

ARROWS

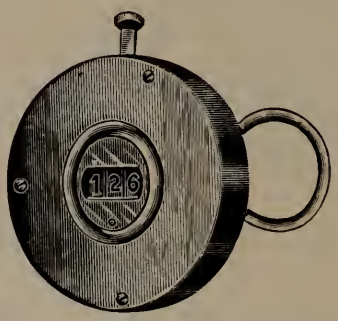


No. 5660.

5666.

No. 5660.	Steel Arrows, 11 in set, 10 in. long, W. G. 6, .	Per set,	$1 20
5661.	" " 11 " 14 " " " 6, .	"	1 50
5664.	Iron " 11 " 14 " " " 10, .	"	75
5666.	Steel " 11 " 14 " " " 6, with white enameled disc, 2½ in. diam., with red figures 1 to 11,	"	5 00
5667.	Canvas Carrying Case for No. 5666, with shoulder strap, ...	Each,	2 50

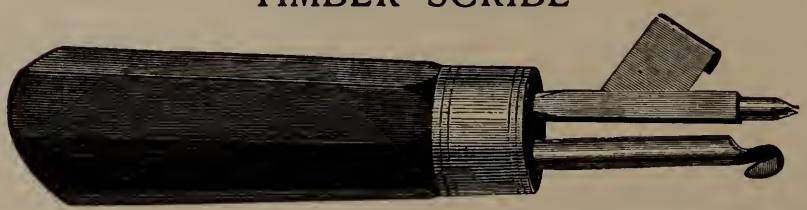
TALLYING MACHINE



No. 5670.

No. 5670.	Tallying Machine, nickel plated, for keeping count by pressing on a lever; registers to 999, ...	Each,	$2 50

TIMBER SCRIBE



No. 5676.

No. 5675.	Timber Scribe, or Tree Marker, small, ...	Each,	$1 00
5676.	" " " " large, ...	"	1 25

PLUMB BOBS

No. 5700. 5710. 5715. 5725. 5721.

No. 5700.	Brass Plumb Bob, about 6 ounces, steel point, screw cap,	Each,	$1 20
5701.	" " " " 8 " " " "	"	1 50
5702.	" " " " 12 " " " "	"	1 80
5706.	" " " " 24 " " " "	"	2 70
5707.	" " " " 6 " " long neck,	"	1 50
5708.	" " " " 8 " " " "	"	1 75
5710.	" " " " 14 " " " "	"	2 25
5711.	" " " " 24 " " " "	"	3 24
5712.	" " " " 32 " " " "	"	3 75
5715.	Adjustable Plumb Bob, 10 " with concealed reel,	"	2 50
5717.	Plain Brass Plumb Bob, about 8 ounces, steel point,	"	75
5718.	" " " " " 12 " " " "	"	1 20
5720.	Iron Plumb Bob, about 7 ounces, ...	"	50

MERCURY PLUMB BOBS

No. 5721.	Mercury Plumb Bob, $3\frac{1}{2}$ ounces, 4 in. long, $\frac{1}{2}$ in. diam.,	Each,	$1 20
5722.	" " " 6 " $4\frac{1}{2}$ " $\frac{5}{8}$ "	"	1 80
5723.	" " " 12 " $5\frac{3}{8}$ " $\frac{7}{8}$ "	"	2 40
5724.	" " " 16 " 6 " 1 "	"	3 00

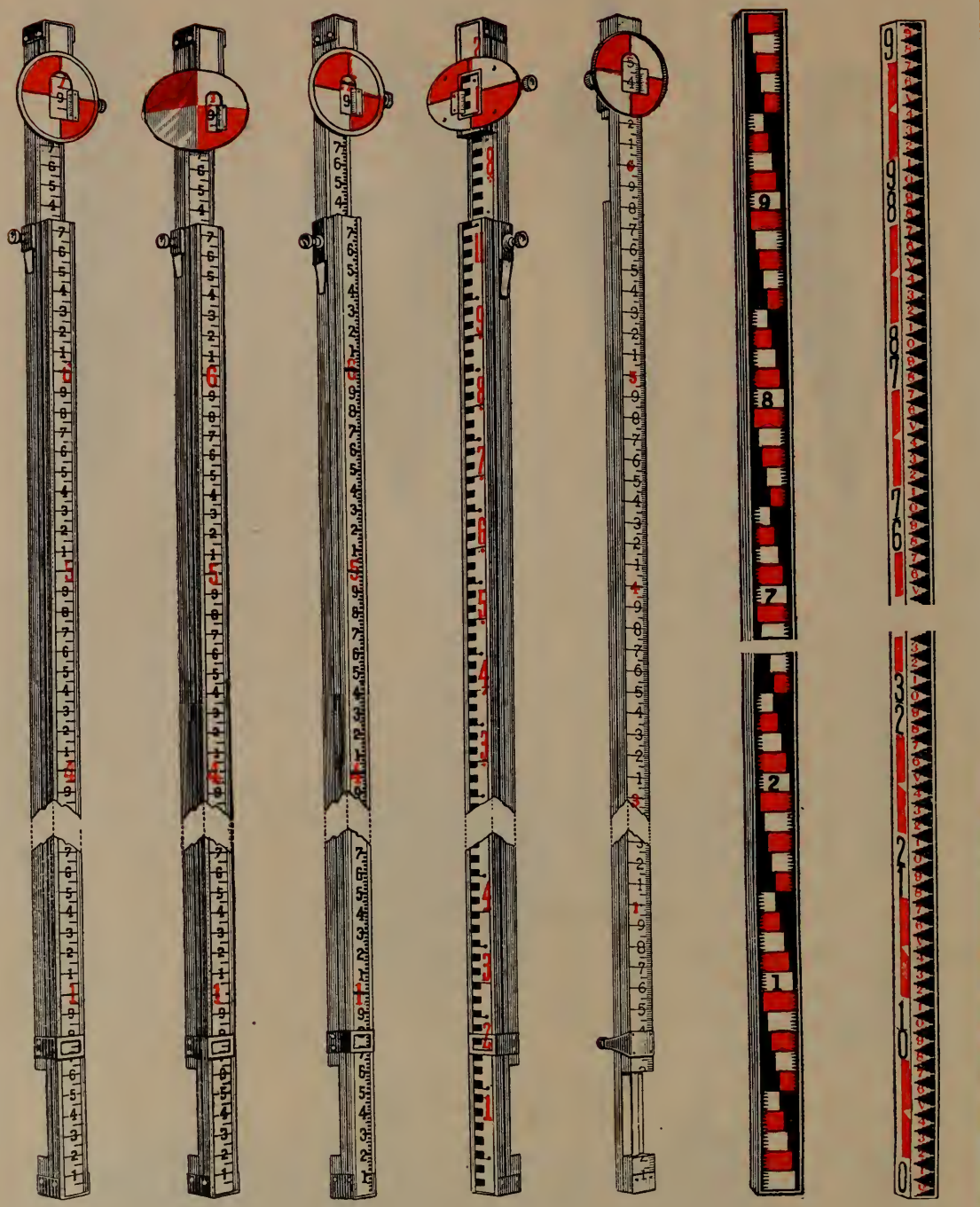
STAKE TACKS

No. 5725.	Stake Tacks, galvanized, ...	Per 2-ounce box,	$0 15
5726.	" " "	Per pound,	60

PLUMB BOB CORD

No. 5730.	Plumb Bob Cord, best linen; thin, medium or thick,	Per yard,	$0 02
5731.	" " " best braided silk, ...	"	06

LEVELING RODS



No. 5805. 5805R. 5809. 5820. 5830. 5831A. 5832A.

For description and prices, see next page.

LEVELING RODS

No. 5805. **Philadelphia Rod,** Hardwood, divided into feet, 10ths and half 10ths, scale reading to 100ths, with target, scale and clamp, 7 feet, sliding out to 13 feet, ... Each, $15 00

5805A. **Philadelphia Rod,** like No. 5805, but with oval target, " 15 50

5805R. " " " " 5805, " " rolling angle target, ... Each, 16 00

5807. **Philadelphia Rod,** like No. 5805, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, . . . Each, 15 00

5807A. **Philadelphia Rod,** like No. 5807, but with oval target, " 15 50

5807R. " " " " 5807, " " rolling angle target, ... Each, 16 00

5808. **Light Philadelphia Rod,** Hardwood, divided into feet, 10ths and half 10ths, scale reading to 100ths, with target, scale and clamp, 6½ feet, sliding out to 12 feet, . . . Each, 13 00

5808A. **Light Philadelphia Rod,** like No. 5808, but with oval target. Each, ... 13 50

5808R. **Light Philadelphia Rod,** like No. 5808, but with rolling angle target, ... Each, 14 00

5809. **Light Philadelphia Rod,** like No. 5808, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, . . Each, 13 00

5809A. **Light Philadelphia Rod,** like No. 5809, but with oval target, Each, ... 13 50

5809R. **Light Philadelphia Rod,** like No. 5809, but with rolling angle target, ... Each, 14 00

5820. **Philadelphia Metric Rod,** Hardwood, divided into meters, dm. and cm., vernier reading to mm., with target, vernier and clamp, 2.2 meter, sliding out to 4 meter, . Each, 15 00

5823. **Mining Rod,** Hardwood, divided into feet, 10ths and half 10ths, scale reading to 100ths, with target, scale and clamp, 3 feet, sliding out to 5 feet, ... Each, 11 40

5824. **Mining Rod,** like No. 5823, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, ... Each, 11 40

5826. **Mining Rod,** Hardwood, divided into feet, 10ths and half 10ths, scale reading to 100ths, with target, scale and clamp, 5 feet, sliding out to 9 feet, ... Each, 12 00

5827. **Mining Rod,** like No. 5826, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, ... Each, 12 00

5830. **New York Rod,** Hardwood, light color, divided into feet, 10ths and 100ths, vernier reading to 1000ths, with target, vernier and clamp, 6½ feet, sliding out to 12 feet, . Each, 14 00

5831A. **Florida Rod,** Hardwood, 10 feet, self-reading to feet, 10ths and 100ths (in one piece), ... Each, 8 00

5831B. **Florida Rod,** like No. 5831A, but 12 feet, . . . " 10 00

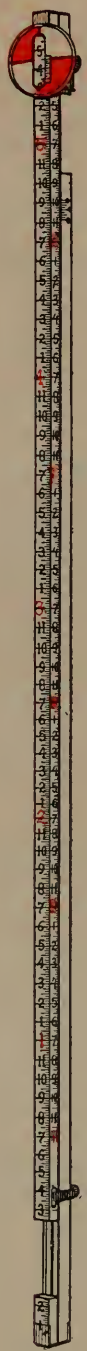
5832A. **Chicago Rod,** Hardwood, 10 feet, self-reading to feet, 10ths and 100ths (in one piece), ... Each, 8 00

5832B. **Chicago Rod,** like No. 5832A, but 12 feet, . . . " 10 00

For Rod Level, see No. 5880.

LEVELING RODS AND POLES

No. 5833.



5835.

5839.

5850.

5851.

5855.

5856.

For description and prices, see next page.

LEVELING RODS

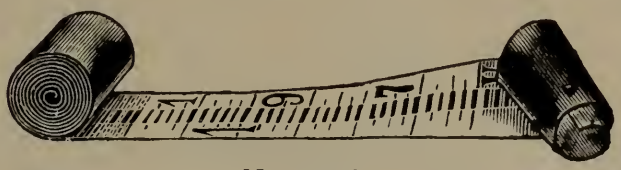
No. 5833. **Stadia Rod,** self-reading, folding, with strong brass hinge, 6 feet closed, opening to 12 feet, ... Each. $12 00

5835. **Architect's Rod,** Hardwood, light color, divided into feet, inches and ⅛-inches, target and clamp, vernier reading to 64th in., 5½ feet, sliding out to 10 feet, ... Each, 6 00

5836. **Architect's Rod,** like No. 5835, but divided into feet, 10ths and 100ths, vernier reading to 1000ths, ... Each, 6 00

5839. **Cross Section Rod,** 10 feet, divided into feet, 10ths and 100ths, on both sides; level bubble at each end, and opening for the hand, ... Each, 10 00

FLEXIBLE POCKET LEVELING RODS



No. 5840.

No. 5840. 10 feet long, divided into feet, 10ths and 100ths, . Each, $3 25

5841. 12 feet long, divided into feet, 10ths and 100ths, . " 4 00

5842. 12 feet long, divided into inches and ⅛-inches, . . " 4 00

5843. 3½ meters long, divided into centimeters, . . . " 4 00

These Rods are made of pliable strong rubber canvas, divided like self-reading rods. Can be coiled up and carried in the pocket. For use, they are fastened to a board or stick with thumb tacks.

RANGING POLES

No. 5850. Ranging Poles, of best seasoned wood, **octagonal,** tapered, painted red and white alternately every foot.

	6 ft.	8 ft.	10 ft.
Each, ...	$2 00	2 25	2 50

5851. Ranging Poles, of best seasoned wood, **round,** tapered, painted red and white alternately every foot.

	6 ft.	8 ft.	10 ft.
Each, ...	$2 00	2 25	2 50

5852. Ranging Poles, **sectional,** of best seasoned wood, **round,** in two sections, painted red and white alternately every foot.

	8 ft.	10 ft.
Each, ...	$3 00	3 50

5854. Steel Ranging Poles (solid), **octagonal,** ½ in., turned and hardened points, painted red and white alternately every foot.

	6 ft.	8 ft.
Each	$3 20	3 50

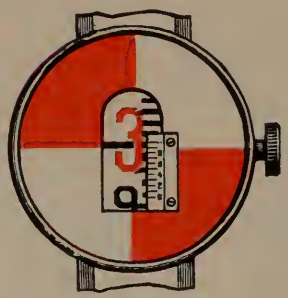
5855. Steel Ranging Poles (solid), **round,** ½ in. diameter, turned and hardened points, painted red and white alternately every foot.

	6 ft.	8 ft.
Each, ...	$2 75	3 00

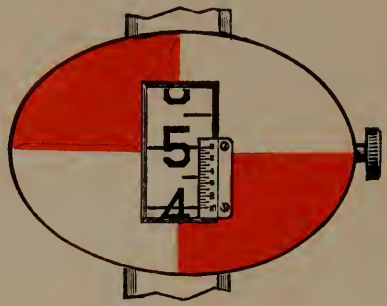
5856. Iron Tubular Ranging Poles, ⅞ in. diameter, painted red and white alternately every foot.

	6 ft.	8 ft.	10 ft.
Each, ...	$2 75	3 00	3 50

SEPARATE TARGETS FOR E. D. CO.'S LEVELING RODS



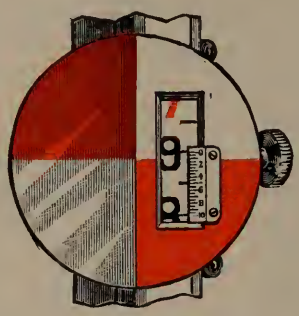
No. 5860.



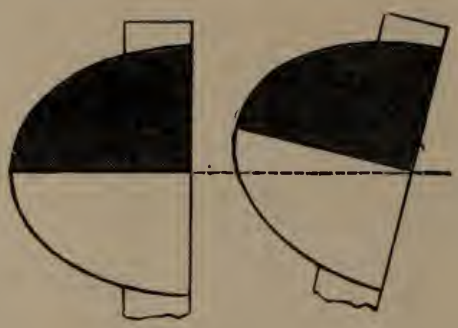
5863.

No. 5860.	Round	Target	for	heavy	Philadelphia	Rods,	Each,	$5 00
5861.	"	"	"	light	"	"	"	5 00
5863.	Oval	"	"	heavy	"	"	"	5 50
5864.	"	"	"	light	"	"	"	5 50
5866.	Round	"	"	New York	Rods,		"	5 00

All Targets are provided with clamp and with scale to read to 100ths or vernier to read to 1000ths, as desired. To insure our furnishing the proper target, please give exact cross-section and division of the rod for which it is intended, or give its catalogue number.



No. 5869.



No. 5868.	Rolling	Angle	Target,	for	heavy	Philadelphia	Rods,	Each, $6 00
5869.	"	"	"	"	light	"	"	" 6 00

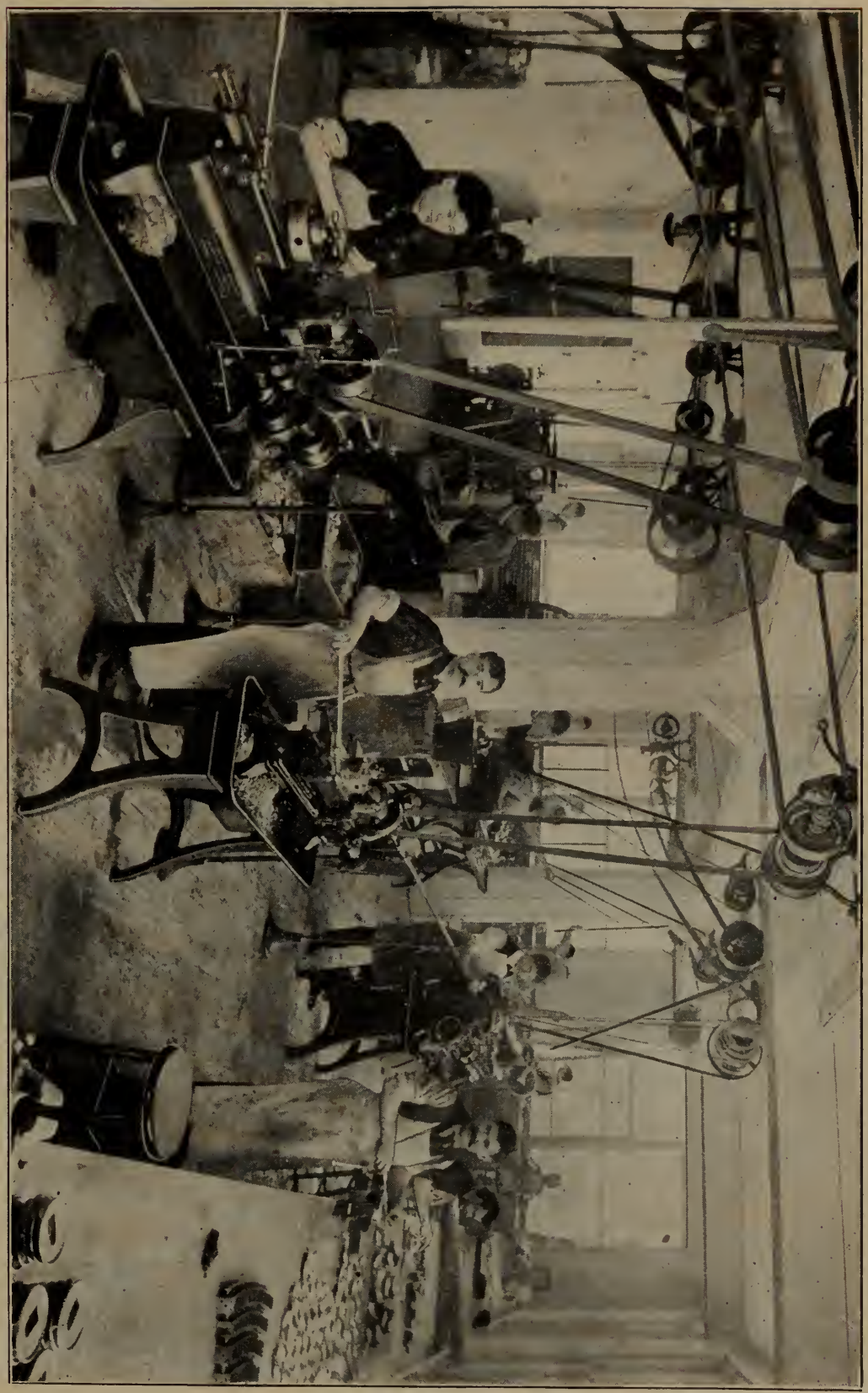
The Rolling Angle Target is so arranged that the horizontal dividing line of the target is carried over two surfaces placed at right angles to each other, thus showing a continuous horizontal line only when the rod is held perpendicular to the observer's line of sight. The target springs are provided with rollers which bear against the rod and permits of a more accurate setting of the target to any desired position.

No. 5880.

ROD LEVEL

No. 5880. Rod Level, brass, round level vial, 1 in., Each, $3 00

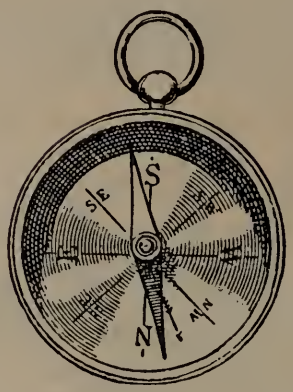
This Rod Level is used to determine that the rod is held perpendicular. By the long rectangular plate, proper contact is secured when holding it to the rod, but it may be attached to the rod by means of a flat-head screw, for which there is a key-hole slot in the plate.



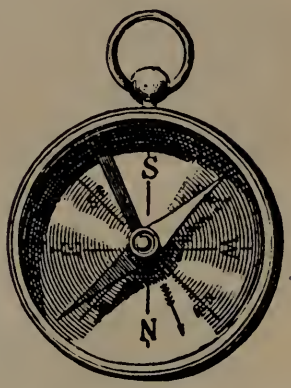
MACHINE SHOP—FACTORY

MAGNETIC POCKET COMPASSES

No. 5900.



5903.



5906.

No. 5900. Pocket Compass, Brass, watch pattern, paper dial.

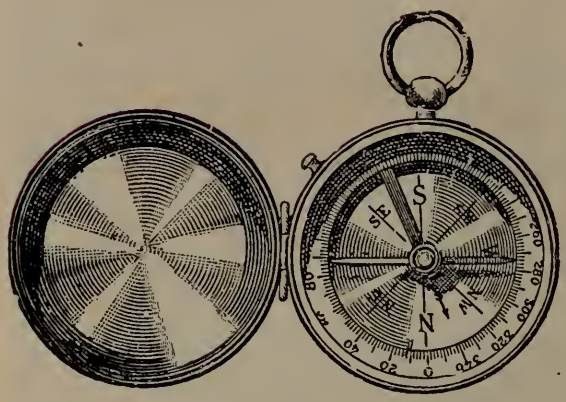
	$1\frac{3}{16}$	$1\frac{3}{8}$	$1\frac{3}{4}$ in
Each,	$0 20	25	30

5903. Pocket Compass, Brass, watch pattern, metal dial.

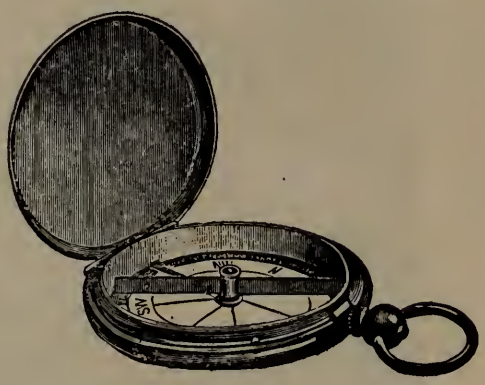
	$1\frac{9}{16}$	$1\frac{3}{4}$	2 in.
Each,	$0 40	45	50

5906. Pocket Compass, Brass, watch pattern, metal dial, stop to needle.

	$1\frac{9}{16}$	$1\frac{3}{4}$	2 in.
Each,	$0 50	55	60



No. 5923.



5930.

No. 5923. Pocket Compass, Brass, watch pattern, hinged cover, metal dial, divided to 2 degrees, stop to needle, agate center.

	$1\frac{9}{16}$	2 in.
Each,	$1 50	1 75

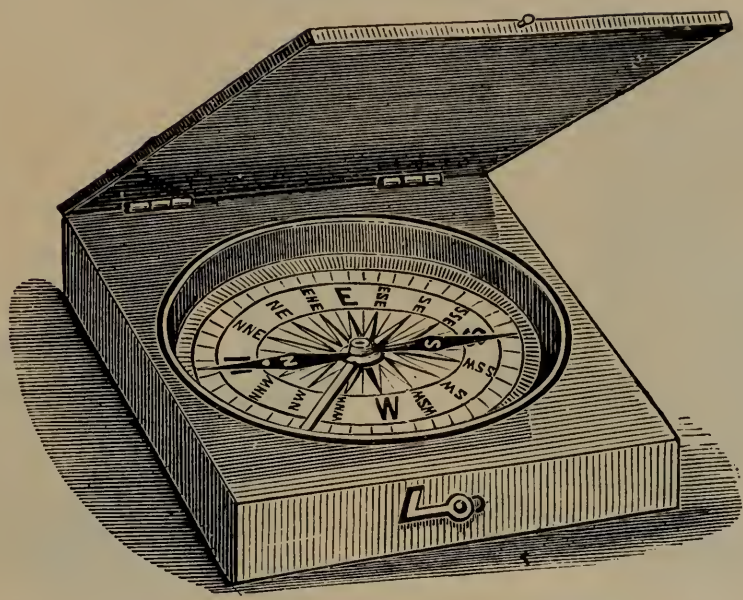
5930. Pocket Compass, bronzed hunting case, watch pattern, silvered metal dial, edge bar needle, jewel cap and self-acting stop.

	$1\frac{1}{2}$	$1\frac{3}{4}$	2 in.
Each,	$2 95	3 20	3 40

5931. Pocket Compass, bronzed hunting case, watch pattern, luminous Singers' floating card dial and luminous line in lid, with luminous North and South points, jewel cap and self-acting stop.

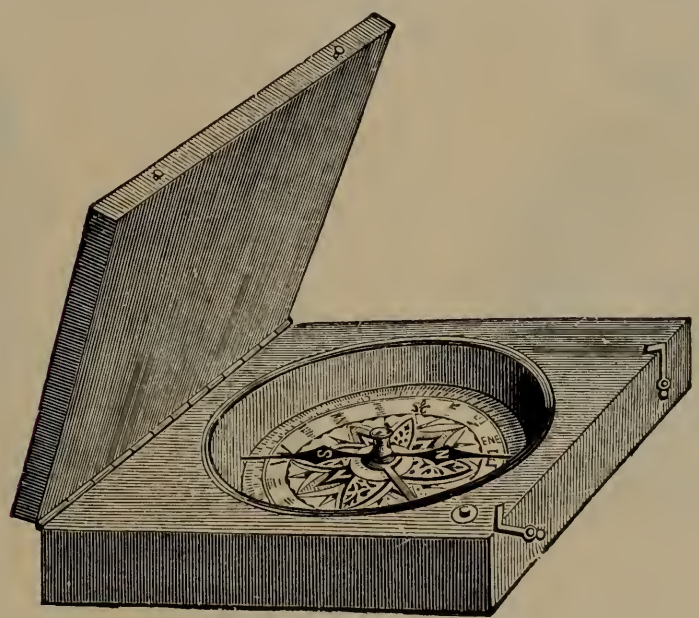
	$1\frac{1}{2}$	$1\frac{3}{4}$	2 in.
Each,	$3 00	3 65	4 25

MAGNETIC POCKET COMPASSES *Continued*



No. 5933.

No. 5933.	Mahogany Case, 3×3-in., card dial, 2-in. needle, with stop, full circle division, ... Each,	$1	25
5934.	Mahogany Case, 3×3-in., metal dial, 2-in. needle, with stop, jeweled, ... Each,	1	40
5935.	Mahogany Case, 3×3-in., metal dial, 2-in. needle, with stop, jeweled, full circle division, ... Each,	1	50
5936.	Mahogany Case, 3×3-in., metal dial, 2-in. bar needle, with stop, jeweled, full circle division, ... Each,	2	40



No. 5937A.

No. 5937A.	Mahogany Case, enameled card dial, best tempered edge bar needle 2-in., with jewel cap and stop, ... Each,	$2	15
5937B.	Same as No. 5937A, but with 2½-in. needle, ... "	2	35
5937D.	Mahogany Case, silvered metal dial, best tempered edge bar needle 2-in., with jewel cap and stop, ... Each,	2	50
5937E.	Same as No. 5937D, but with 2½-in. needle, . . . "	2	75

MAGNETIC POCKET COMPASSES *Continued*

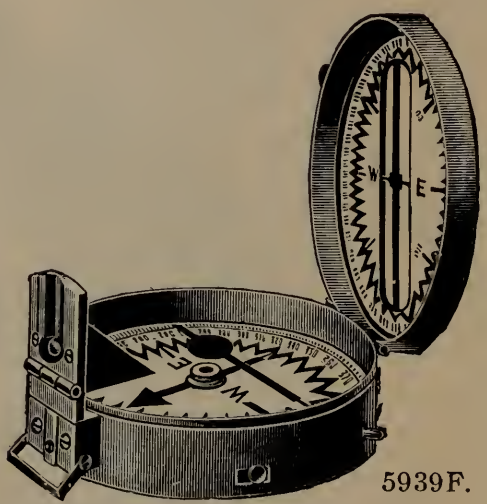
No. 5938.

No. 5939B.

No. 5938. Military Compass, 3×3 in., bar needle about 2½ in., with agate centre and automatic stop, graduated on raised metal ring to degrees. Polished mahogany box with sighting line on inside of cover, ... Each, $ 4 00

5939B. Military Night Marching Compass, bronzed hunting case, aluminum dial graduated to 5 degrees, luminous centre, with sight in lid and sight hole in pendant, . . Each, 10 75

No. 5939D.

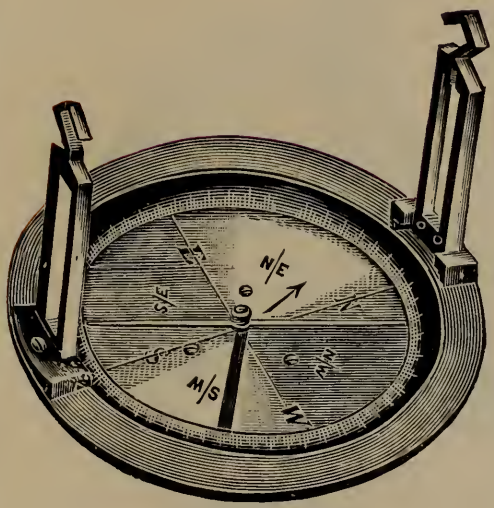


5939F.

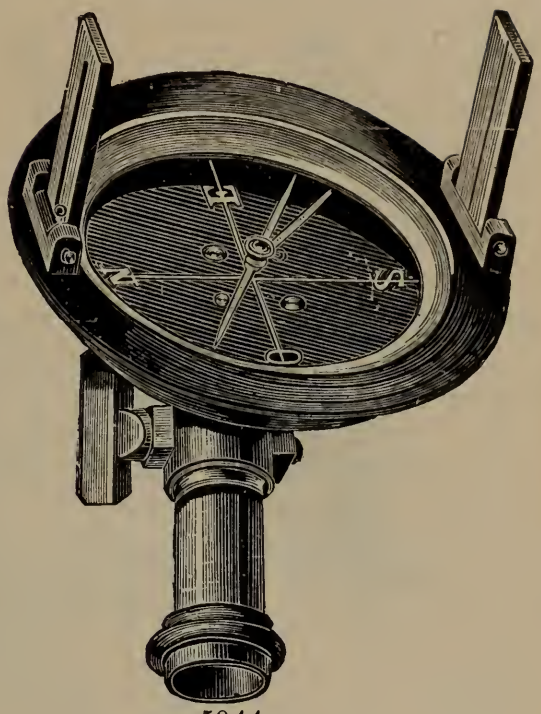
No. 5939D. Collapsable Mariner's Pocket Compass, 2 in., nickel hunting case, watch pattern, with gimbals constructed to collapse, Singer's pearl dial with stop, with luminous North and South points, ... Each, $ 7 75

5939F. Day and Night Prismatic Compass, 2 in., floating card dial, graduated luminous centre, with central movable setting and reading bar, sight vane in lid and case. Inside of lid fitted with a luminous graduated card for map reading and protracting purposes and night marching. In leather sling case, ... Each, 19 80

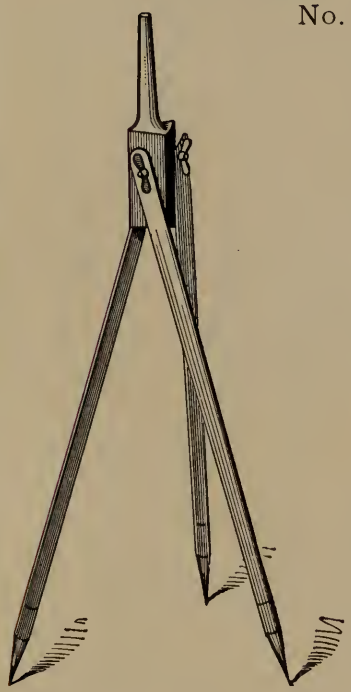
SURVEYING COMPASSES



No. 5940.



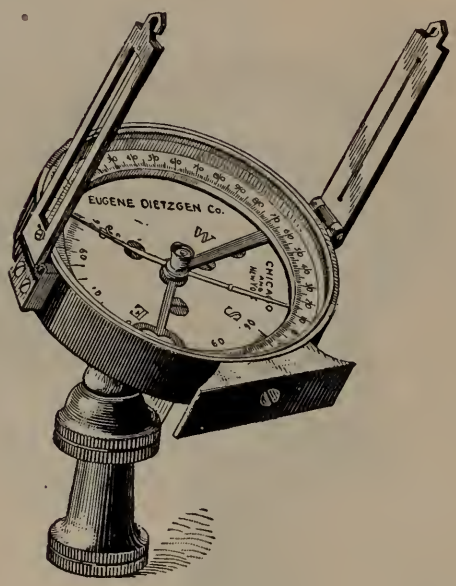
5944.



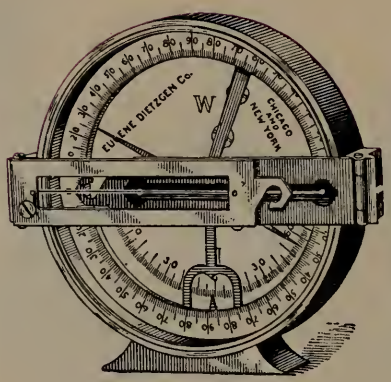
No. 5959.

No. 5940.	Surveying Compass, with folding sights, ending in hooks, graduated to 1 degree, needle 2 in., in mahogany case, Each,	$6 00
5941.	Same as 5940, needle 2⅛ in., in mahogany case, ... Each,	7 00
5942.	Same as 5940, needle 2½ in., in mahogany case, ... Each,	8 00
5944.	Surveying Compass, with folding sights graduated to 1 degree, with ball joint and socket for Jacob-staff mounting, needle 2½ in., in mahogany case, Each,	10 00
5946.	Surveying Compass with folding sights ending in hooks, silvered compass box, graduated on raised ring to degrees, needle 3½ in., with ruby center and stop, ball and socket joint, in mahogany case, ... Each,	12 00
5948.	Surveying Compass, with folding sights graduated to 1 degree, with two bubbles, ball joint and socket for Jacob-staff mounting, needle 2½ in., in mahogany case, ... Each,	13 50
5949.	Same as 5948, needle 3½ in., in mahogany case, ... Each,	14 50
No. 5957.	Same as 5948, needle 4⅛ in., in mahogany case, . . "	16 00
5958.	Jacob-staff, 5 feet, iron shoe, ... "	1 00
5959.	Tripod, with Jacob-staff top for compasses, light, . "	3 00

SURVEYING COMPASSES *Continued*



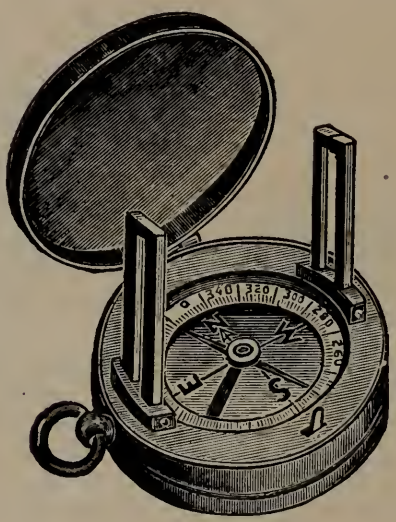
As Compass.



No. 5961. As Clinometer.

No. 5961. Surveying Compass and Clinometer, bronzed, with folding sights ending in hooks, graduated to degrees, with ball joint and socket for Jacob-staff mounting, needle about 2 in., in case, Each, $12 60

5963. Same as No. 5961, needle about 2½ in., in case, . . . " 13 70

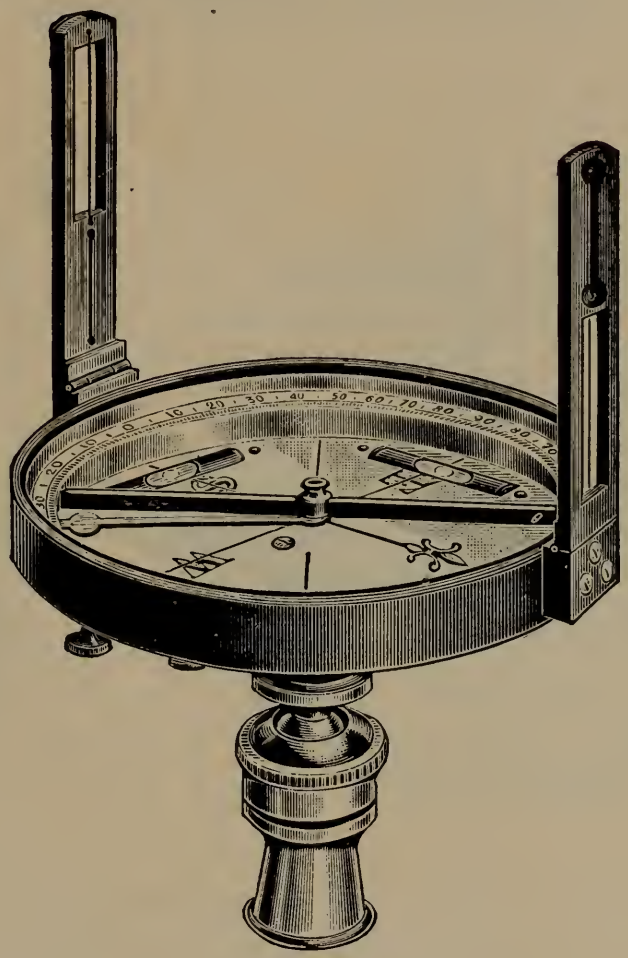


No. 5965.

No. 5965. Pocket Compass, nickel plated, watch pattern, with folding sights, stop to needle. . . . . 2 2⅜ 2¼ in.
Each, ... $4 50 5 75 7 00

SURVEYING COMPASSES

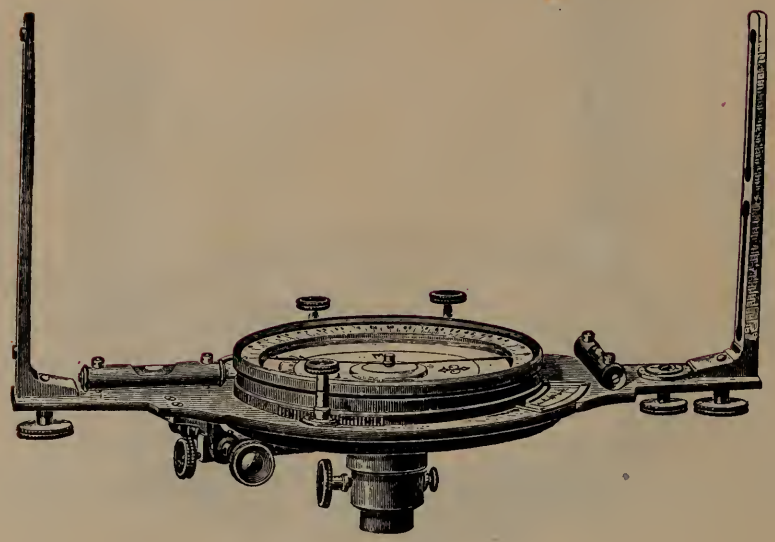
Continued



No. 5967A.

No. 5967A.	Surveying Vernier Compass, 3½ in. needle, with ruby center and stop, silvered compass box, graduated on raised ring to degrees, variation ring reading to 5 minutes, folding sights, two levels, ball joint and socket for Jacob-staff mounting, in polished mahogany case, ... Each,	$16 00
5967B.	Same as No. 5967A, but with light extension tripod, "	21 00
5968A.	Surveying Vernier Compass, same as No. 5967A, but with 4½ in. needle, ... Each,	18 00
5968B.	Same as No. 5968A, but with light extension tripod, "	23 00
5970.	Surveying Compass, 4 in. needle, two straight levels, Jacob-staff mountings, brass cover, out-keeper, sights graduated for taking angles of elevation or depression, in box, Each,	30 00
5971.	Same as No. 5970, but with 5 in. needle, . . . "	35 00
5972.	Same as No. 5970, but with 6 in. needle, . . . "	40 00

RAILROAD COMPASSES



No. 5980.

No. 5980. Railroad Compass. The Railroad Compass has the main plate, levels, sights and needle, Jacob-staff mountings, brass cover, out-keeper, and vernier for setting off the variations of the needle of the ordinary Surveyors' Compass, but has also underneath the main plate a divided circle or limb, by which horizontal angles to single minutes can be read independently of the needle, in mahogany box with lock and strap, 5½ in. needle, one vernier to limb, ... Each, $65 00

5981. Railroad Compass. Same as No. 5980, but with 5 in. needle and two verniers to limb, ... Each, 75 00

5982. Railroad Compass. Same as No. 5980, but with 5½ in. needle and two verniers to limb, ... Each, 80 00

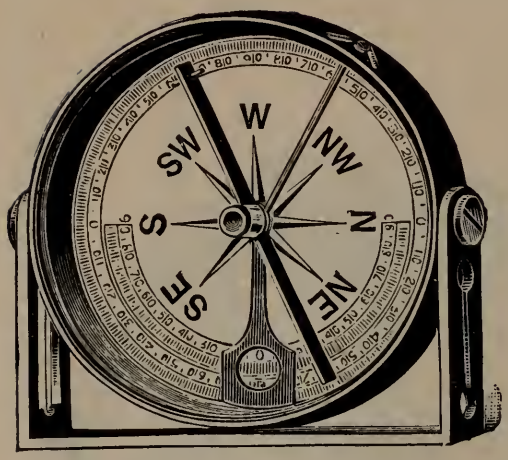
MINERS' COMPASSES AND LAMP

No. 5983.

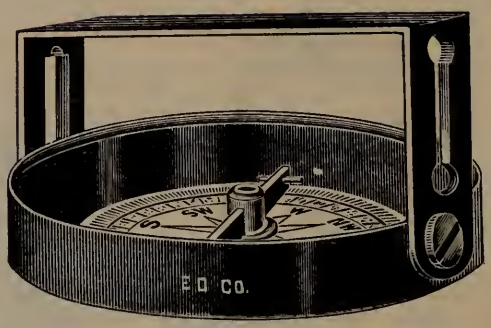
5985.

No. 5983.	Plummet Lamp, of brass, steel point, about 20 ounces, Each,	$10	00
5984.	Box with shoulder straps, for pair of Plummet Lamps, "	4	00
5985.	Miners' Compass, for tracing iron ore, with 3 in. dip needle, mounted in a brass ring graduated 0 to 90° in each direction, and having plate glass top and bottom. When used for tracing ore, the prospector should hold the ring in his hand and keep the needle north and south, standing with his face to the west; in velvet lined case, . . . Each,	12	00
5987.	Meridian Finder, or Miners' Compass, with 3 in. Norwegian needle, suspended in gimbals. The advantage of this compass is that the needle has a motion in azimuth as well as in altitude, thus insuring the needle finding its true meridian. Also that the needle is suspended in such a way that it turns easily with nothing to impede its revolution; by this means you have a perfect test in reversing the needle. Another advantage is that the needle is, and can be made more sensitive than other needles of this kind; in case, ... Each,	14	00

SIGHT COMPASS AND CLINOMETER



No. 5988—As Clinometer.

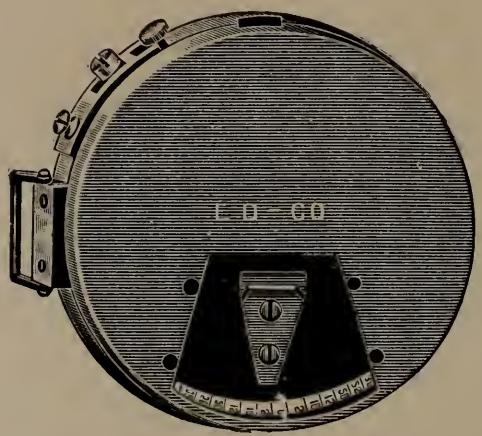


As Sight Compass.

No. 5988. Bronzed Sight Compass and Clinometer, metal dial, graduated to 1 degree, edge bar needle with stop. The sights are pivoted to the compass box and connected by a cross bar, which is turned down to serve as foot when the instrument is used as Clinometer. The Clinometer gives inclinations in inches per yard and in degrees. Diameter 2½ in., in box, ... Each, $ 7 25

5989. Same as above, diameter 3 in., in box, ... " 8 75

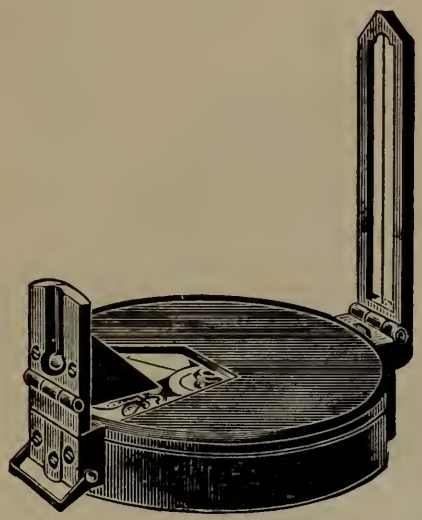
5989½. " " " " 4 in., " . . . . . " 10 45



No. 5989B.

No. 5989B. Military Clinometer, bronzed case, 3 in., for measuring angles of elevation or depression, ivory arc scale held clamped, and by pressing on knob, is released to swing freely. The graduations of the arc are from 0 to 45° in each direction; the red scale denotes elevation, the black scale depression, in leather sling case, . . . Each, $19 25

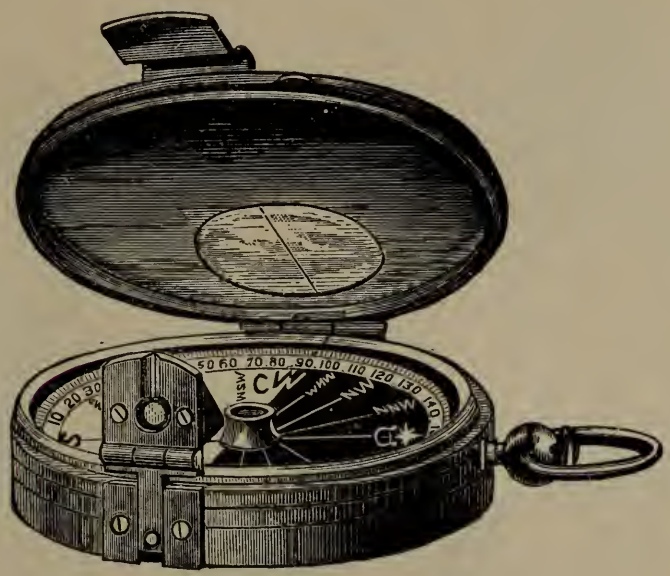
PRISMATIC COMPASSES



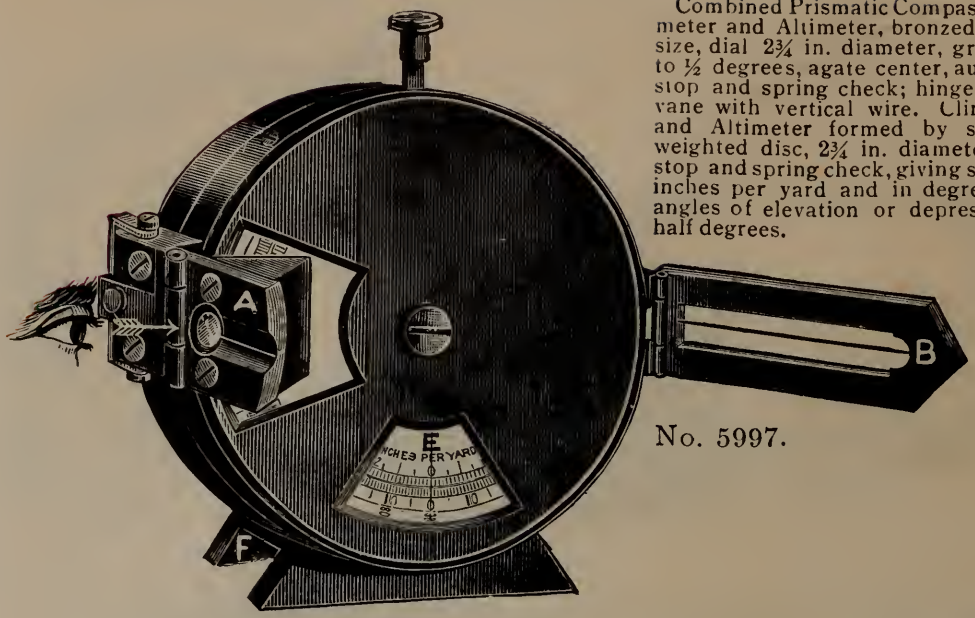
No. 5991.

No. 5990. Hutchinson's Prismatic Compass, bronzed, of improved pattern, with opening in top, floating card dial, 2 in., in morocco case, ... Each, $11 00

5991. Same as No. 5990, but 3 in., in leather sling case, . " 16 00


50 60 70 80 90 100 110 120 130 140
10 20 30
CW
NW
NNW
NNW
NN

PRISMATIC COMPASSES *Continued*



Combined Prismatic Compass, Clinometer and Altimeter, bronzed, pocket size, dial 2¾ in. diameter, graduated to ½ degrees, agate center, automatic stop and spring check; hinged sight-vane with vertical wire. Clinometer and Altimeter formed by sensitive weighted disc, 2¾ in. diameter, with stop and spring check, giving slopes in inches per yard and in degrees, and angles of elevation or depression in half degrees.

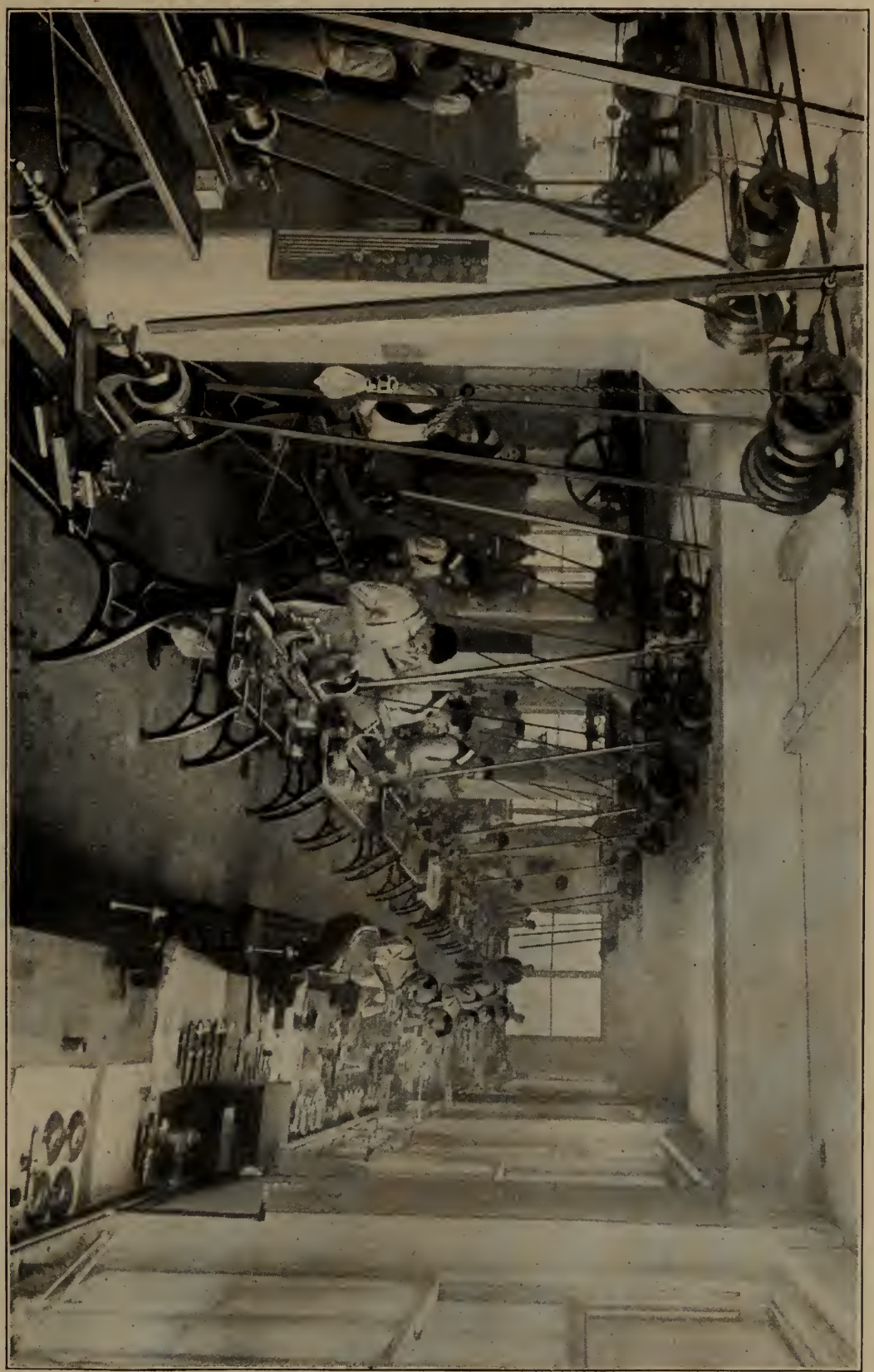
No. 5997.

No. 5997. Combined Prismatic Compass, in leather sling case, Each, $27 00

Prismatic Military Compass, heavy bronzed, with hinged lid, 2⅛ inch diameter, with sighting line in lid. Outside of case is divided to 5 degrees with lettered compass points to correspond. The rim holding glass is milled for revolving when using the direction line, pearl dial, machine divided and engraved; with two circles of divisions, the outer circle is for use with prism and divided to single degrees, the inner circle is divided to 5 degrees. Centre of the dial is luminous, "N" and "S" being marked by arrow point and line E and W points being lettered to correspond. The top and bottom of sight line in lid is also made luminous. A rubber friction ring is fitted underneath case.

No. 5998.

No. 5998. Prismatic Military Compass, in leather sling case, Each, $28 50



SURVEYING INSTRUMENTS DEPARTMENT — FACTORY

ENGINEERING AND SURVEYING INSTRUMENTS

MADE BY

EUGENE DIETZGEN CO.

The Transits and Levels illustrated and described in the following pages are of the most improved construction, and are more accurate and reliable and much stronger than any other make.

The materials employed are of the best, the graduations the most accurate, the lenses for telescope are of the finest quality, and the workmanship and finish of the highest order.

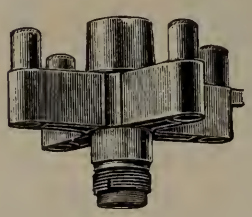
The instruments as illustrated are our regular patterns which we carry in stock, but we are prepared to make such alterations, as far as practicable, which the experience of our professional friends may demand.

IMPORTANT FEATURES OF OUR INSTRUMENTS

Next to the graduation it is equally important that the centers of the Transits and Levels be made of the proper material and accurately fitted.

The inner centers of the transits are made of bell metal, have long tapers and large substantial flanges. The outer centers are made of Phosphor bronze, and are so constructed that the center of gravity is nearer the tripod head than any other style. Great care and skill is required to make the centers fit throughout their length without undue friction, and to have them truly spherical. All of our centers are turned between dead centers.

The centers of the Engineers' Levels, where the presence of steel or iron is not prohibitory, are made of steel.



The **Parallel Plate** to which the leveling screws are fitted has four well-braced arms, which have the advantage over the solid plate in that they afford more room for manipulating the leveling screws. The leveling screws on our instruments have a very deep thread, slightly rounded on top and bottom, and are cut on an automatic screw machine, which insures a fine, uniform and smooth motion and a greater durability than the sharp V threads usually employed. The screws have large milled finger heads, and are made of composition metal, well hammered before they are turned and cut, and are protected by dust caps.

THE TELESCOPE

The lenses in all our Telescopes are ground by the best opticians, of special glass, and to recalculated formula. The slide to which the object glass is attached is extra long, and fits directly into the main tube. Particular attention is paid to fitting this slide to prevent the slightest shake and still procure an even and smooth motion, which is absolutely necessary for true lines of collimation and permanent adjustment. To preserve the smooth working of the object slide, we have provided all our instruments with the Rain and Dust Protector.

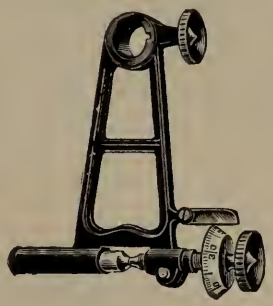
The motion of the telescope slide is controlled by a rack and pinion, and the focusing of the eye-piece is accomplished in an improved screw-like manner by turning the cap, covering the eye-piece about one-sixth of a revolution, thus affording a true and even motion.

MAGNIFYING POWER

The power we chose for each of the several Transit telescopes is the one where the slightest motion of vernier or levels in the field of view is to be easily observed. A higher power is needless, and can only serve to proportionately decrease the illuminations; consequently, to obtain the best results, the magnifying power of a telescope should not be greater than its intended purposes demand, in order to maintain a large field with plenty of light and clear definition.

In our Terrestrial (erecting) Telescopes the regular Nos. 6035 to 6055 Transits, with an objective $1\frac{1}{4}$ inch aperture, we obtain a power of 26 diameter, and in the 18 inch Y Level, with the large objective of $1\frac{3}{8}$ inch and increased focal length, a power of 33 diameter is obtained.

CLAMP AND TANGENT SCREWS



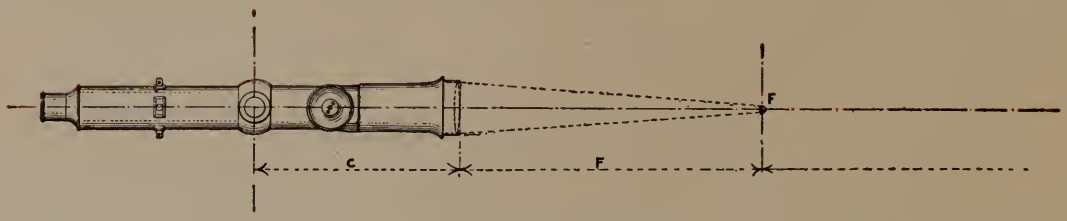
The clamps act entirely on the centers, both plates are free from any strain when clamped, and the levels are unaffected. This construction allows the plates to be fitted so closely as to make the entering of dust and grit between them impossible. The tangent screws consist of a single screw, made of Phosphor bronze, and an opposing spiral spring to take up the lost motion. The motion thus produced is perfectly smooth, and will not be destroyed even if the screw should get injured.

The position of the clamp and tangent screws is such that they are very accessible, but still well protected from possible injury. The tangent screw on our Levels is attached to the cross bar, and the clamp revolves with it and is always in the same relative position.

THE SPIRIT LEVELS

The level vials used on our instruments are all carefully ground, and tested by us to see that the curve is regular and the tube perfectly symmetrical, and are all selected as to sensibility in accordance with the use of the instrument for which they are intended. The telescope bubbles are longer and more sensitive than those usually employed; they are all graduated on the glass, and are in keeping with the high grade of the instruments.

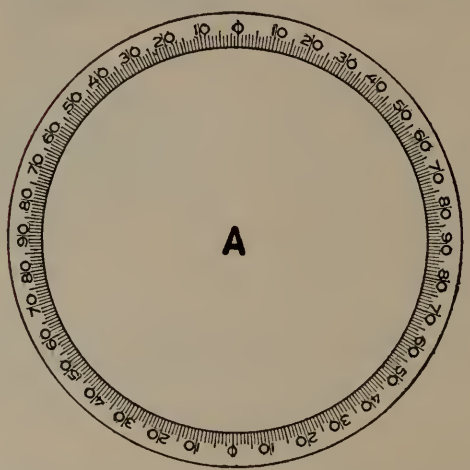
STADIA MEASURING

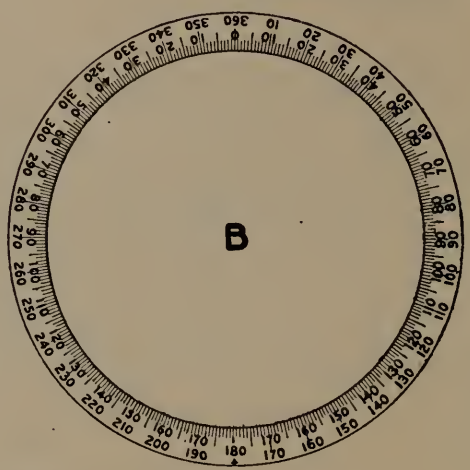


The Stadia is a device for measuring distances, and consists essentially of two extra parallel hairs in addition to the ordinary cross hairs of the Transit or Level telescope. The stadia hairs may be adjustable or they may be fixed permanently on the diaphragm.

In our Transit and Level Telescopes the fixed stadia hairs are so set that they will intercept one foot on a rod at a distance of 100 feet, since the image of the cross hairs is projected to a point beyond the telescope objective equal to its focul length; the rays of light converge at that point and measurements must begin from there, therefore, a constant is to be added to all stadia readings equal to the focal length of the object glass plus the distance from the face of objective to the center of the instrument. This constant is termed "F+C" and for Transit telescopes is about equal to one foot. The stadia hairs are the most superior of the many appliances for measuring distances. With the telescope furnished with our instruments possessing all of the best optical and mechanical qualities that can be produced, we feel justified in warranting good results.

THE GRADUATIONS

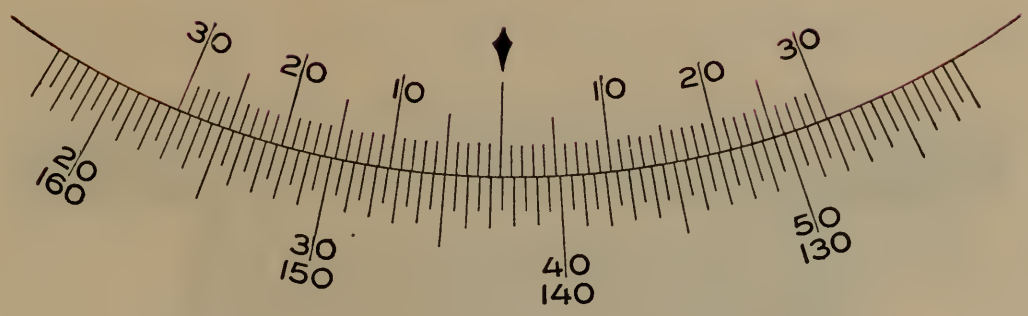




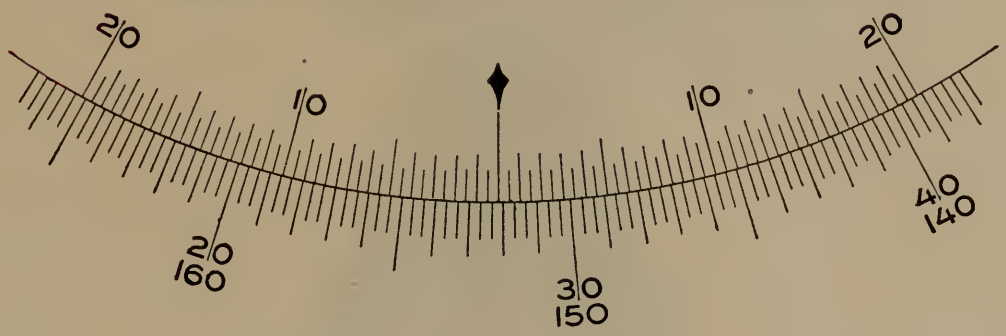
This most important part of the Transit instruments of our make receives particular care and attention with regard to temperature and centering of plates upon the dividing engine in order to obtain the best results.

The lines of our graduations are perfectly straight, smooth and uniform in width, and thoroughly black. The compass ring and vertical circle are numbered in quadrants from 0 to 90, see Figure "A." The numbering of the degrees as shown in Figure "B" is from 0 to 180 each way, and a second row from 0 to 360.

TRANSIT VERNIERS



Style C.



Style D.

The limb and verniers of our high grade Transits are all graduated on solid silver, and made to read by vernier either to single minutes, Style "C" or 30 seconds, Style "D." The limb and verniers are exactly on the same plane, which excludes any parallax.

We are prepared to make and furnish to order graduations of any desired fineness, and number them according to the special wishes of our customer.

GENERAL CONSTRUCTION

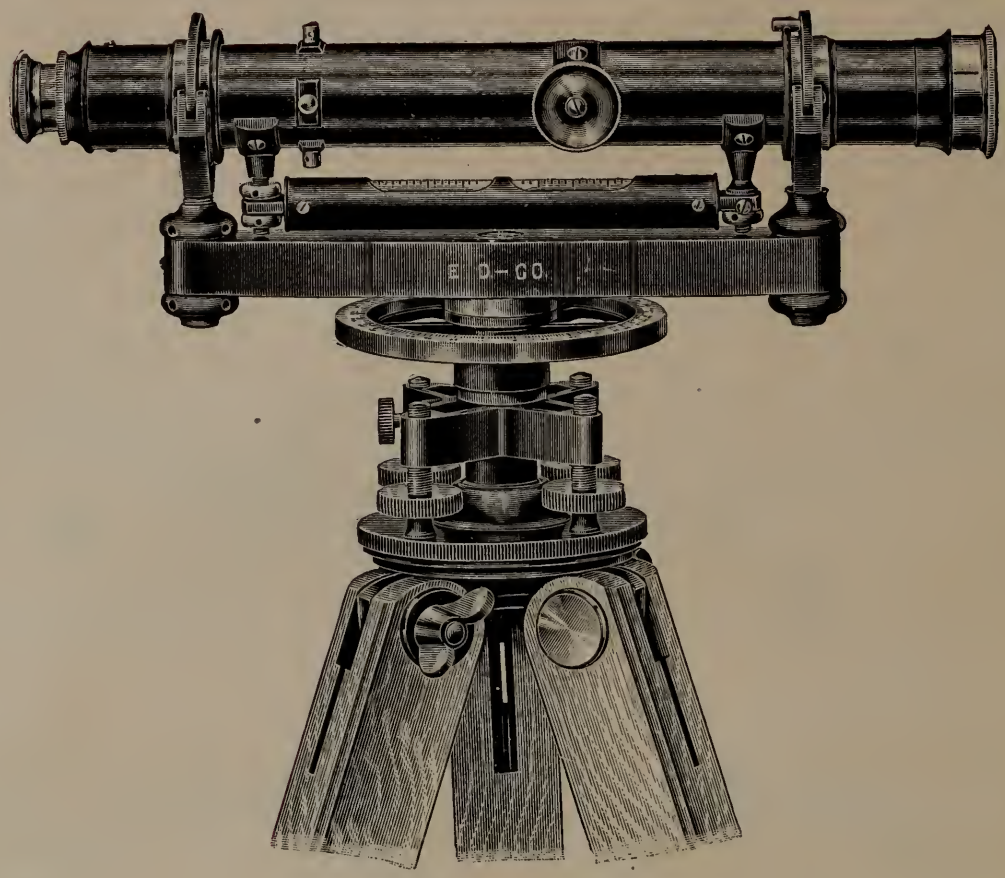
Upon examining the cuts it will be noticed that all our instruments are provided with all the latest improvements. By the judicious placing of the centers which reach to the base of lower parallel plate, we bring the limb and vernier plate in our Transits, and the level bar and "Y's" of the Y Level closer to the tripod head than any other make, thus insuring the utmost stability.

For Lower Priced Instruments, see our "Standard" Levels and Transits, described and illustrated on pages 396-400.

For Repairs and Parts of Instruments, see pages 403-404.

ARCHITECTS' LEVEL

Each Instrument of our make is warranted to be first-class in every particular.



No. 6005.

No. 6005. Architects' Level, is of superior quality, and, in fact, of the same accurate workmanship as our larger Levels. It has a telescope 11½ inches long, magnifying power 18 dia. and is provided with 4 leveling screws and clamp to spindle. The horizontal circle is 3 inches in diameter, fitted to the upper end of the socket, and turning readily. It is graduated to degrees numbered from 0 to 90 each way, and has a vernier to read to 5 minutes, which is screwed to the flange of the center.

The telescope is of good definition, and is focused by rack and pinion. The eye-piece turns in a screw-like manner to enable precise focusing of the cross hairs.

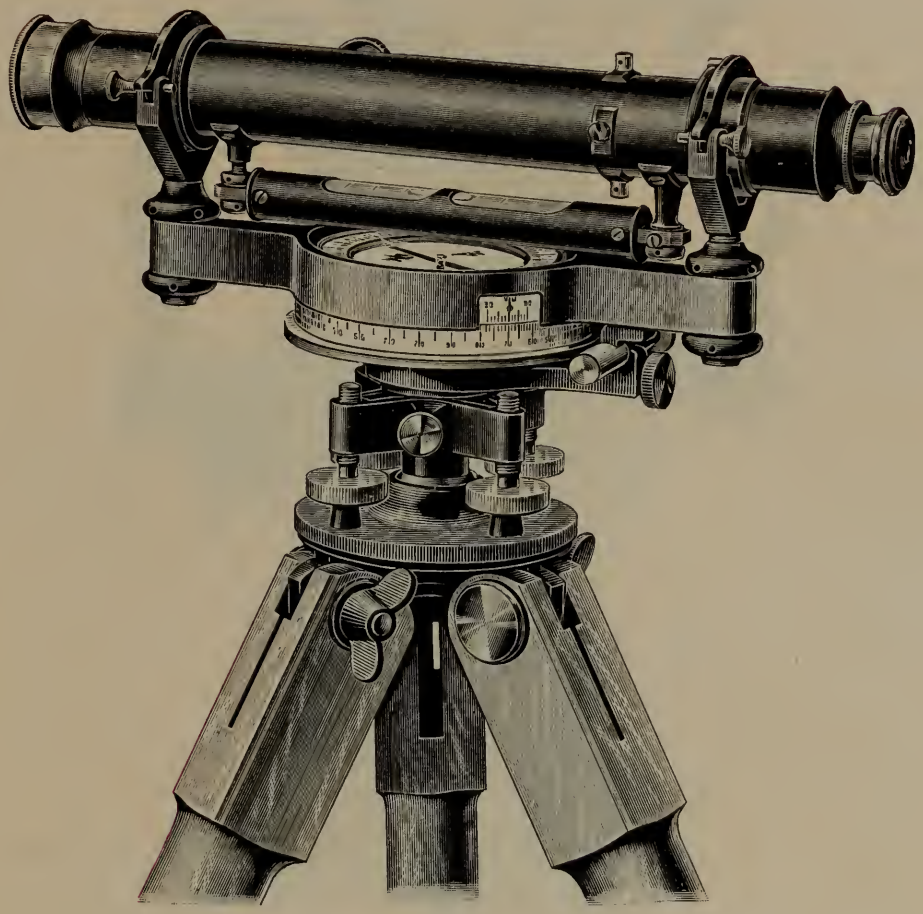
The bubble is 5 inches long and is graduated to facilitate leveling up. The instrument packs whole, and stands in box erect. The box is provided with leather strap, and contains a plumb bob trivet (for setting level firmly on a surface of stone or wood), adjusting pins, sun shade and plumb bob.

No. 6005.	Architects' Level, complete with tripod No. 6202, box, etc.	Each,	$45 00
6006.	Architects' Level, like No. 6005, but with tangent screw, ...	"	50 00

ARCHITECTS' LEVEL

WITH COMPASS

Each Instrument of our make is warranted to be first-class in every particular.



No. 6011.

No. 6010. Architects' Level with Compass, is similar in construction to the Architects' Level No. 6005, but is fitted with a compass with 3 in. needle, so arranged that it adds practically nothing to the weight or bulk, while its value in many kinds of work is obvious.

The telescope is 11½ inches long, magnifying power 18 dia., and is provided with 4 leveling screws and clamp to spindle.

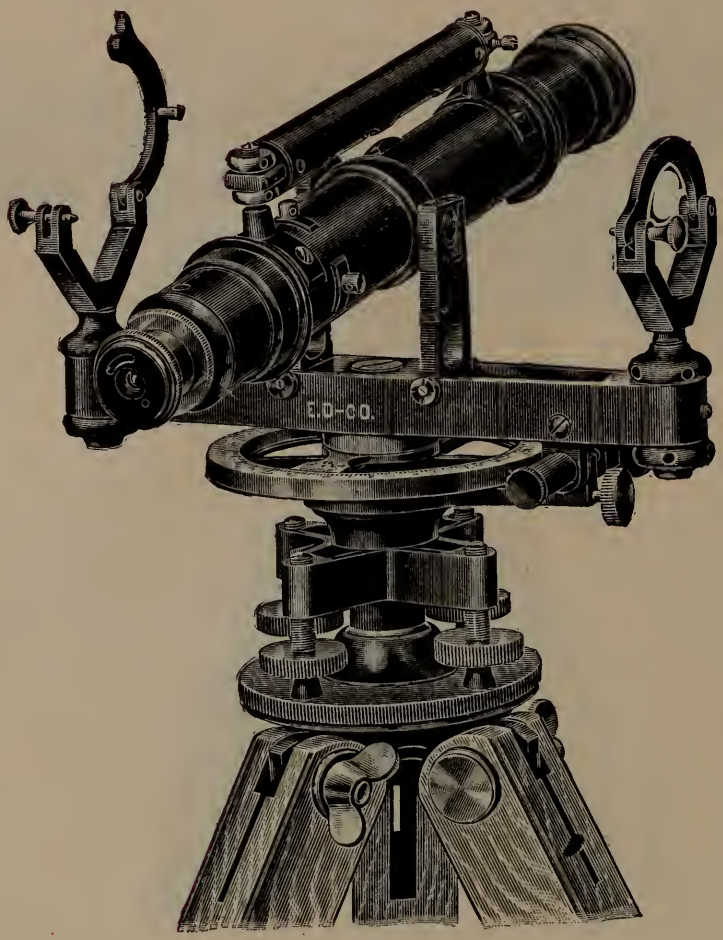
The horizontal circle is about 3⅝ inches in diameter, graduated to degrees with vernier reading to 5 minutes.

The instrument packs whole, and box for same is provided with leather strap and contains plumb bob trivet (for setting level firmly on a surface of stone or wood), adjusting pins, sun-shade and plumb bob.

No. 6010.	Complete, with tripod No. 6202, box, etc., ...	Each,	$60 00
6011.	Architects' Level with Compass, like No. 6010, but with Tangent screw, ...	Each,	65 00

CONVERTIBLE ARCHITECTS' LEVEL

Each Instrument of our make is warranted to be first-class in every particular.



No. 6013.

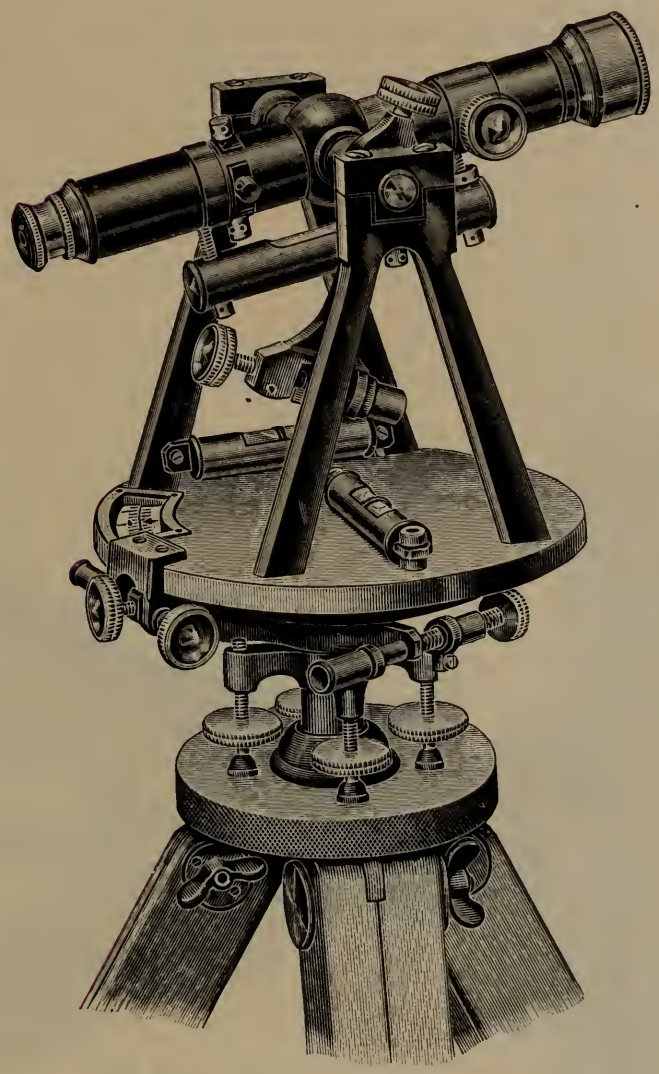
No. 6013. Convertible Architects' Level, in its general construction is similar to our Architects' Level No. 6006, but the level bar is provided with a pair of ***folding standards,*** and the telescope has a permanent axis with suitable bearings to fit the folding standards for vertical sighting. With this arrangement vertical sights can be taken to the extent of 45 degrees in either direction. When the instrument is used as a level the standards are folded into the recess provided for them in the level bar.

This instrument is furnished with ***clamp and tangent screw*** and is packed in a suitable box containing metal trivet, adjusting pins, sun-shade and plumb bob.

No. 6013. Convertible Architects' Level, complete with tripod No. 6202, box, etc., ... Each, $60 00

For Architects' Leveling Rods, see Nos. 5835-5836.

BUILDERS' TRANSIT



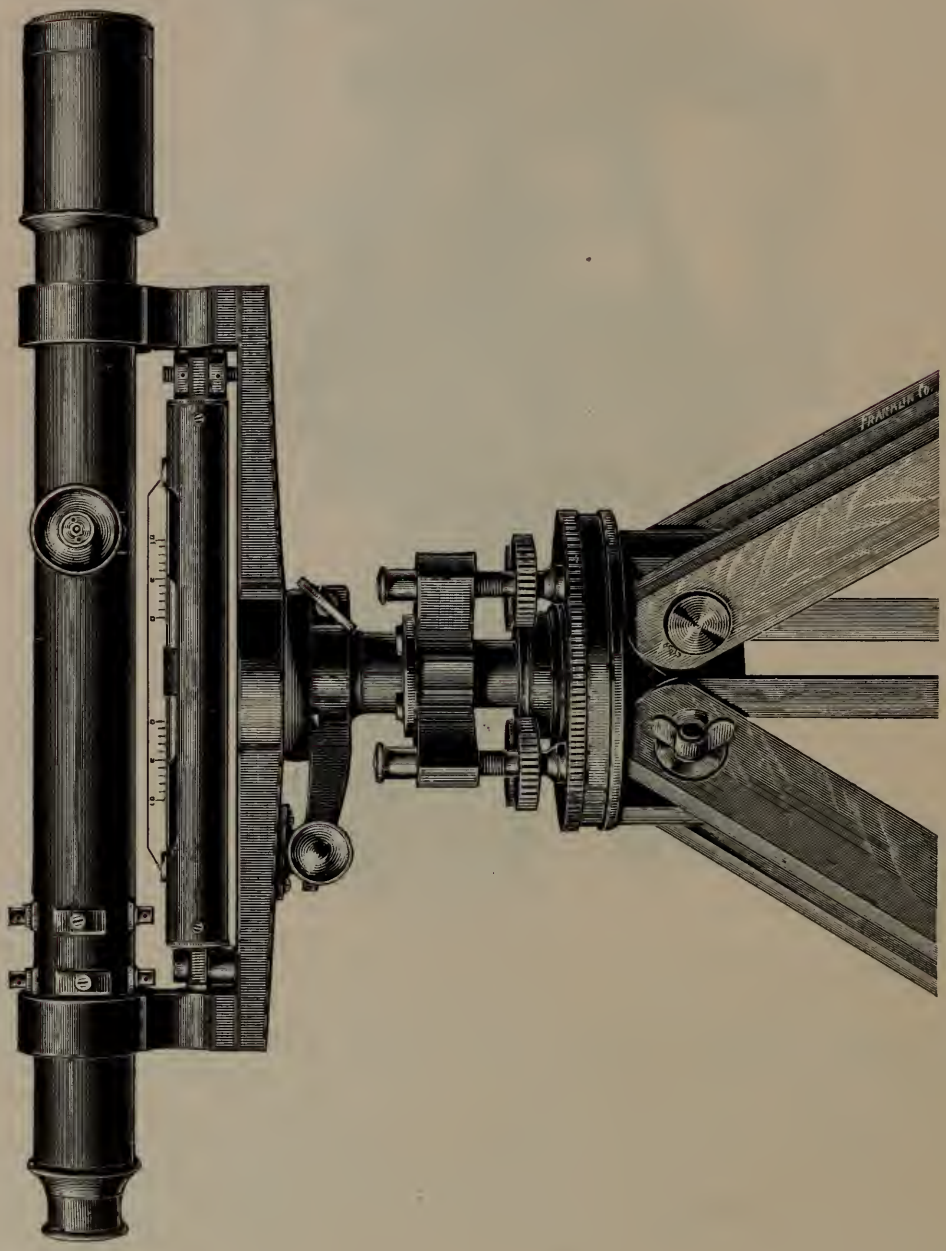
No. 6015.

No. 6015. Builders' Transit, with telescope about 8 in. long, of high power, with long sensitive level on same; clamp and tangent to telescope axis. The horizontal limb is 5 inches in diameter, divided to degrees, with vernier reading to 2 minutes. The vernier plate is fitted with two levels at right angles, and clamp and tangent screws to both upper and lower circles, and is leveled up by four leveling screws. Instrument packed in polished wooden box, with sun-shade, plumb bob, screw-driver and adjusting pin.

No. 6015.	Builders' Transit, complete with tripod, box, etc.,	Each,	$ 80 00
6017.	" " same as No. 6015, but having Compass with raised ring, silvered, graduated to degrees, with variation plate, needle about 3 in., ...	Each,	100 00

ENGINEERS' DUMPY LEVEL

Each Instrument of our make is warranted to be first-class in every particular.



No. 6025.

No. 6025. Engineers' Dumpy Level, as described on next page, with steel center and telescope of 29 dia. magnifying power, showing objects erect, complete, with tripod No. 6204, box, etc., Each, $110 00

ENGINEERS' DUMPY LEVEL *Continued*

Cut No. 6025 represents the Engineers' Dumpy Level, as made by us.

We have made this instrument of various different sizes, the length of telescopes ranging from 15 to 18 inches, both with erecting and inverting eye-pieces.

With a Dumpy Level, *of our make*, possessing all the good qualities, POWERFUL TELESCOPE, long, sensitive level, steel center and stability, we feel confident that the results of the work will fully equal those of the best Y level. While the adjustment of the latter is made easier, yet, there being less parts to former, it will retain its adjustment longer.

The instrument, as illustrated, has a telescope 15 inches long, provided with DUST PROTECTOR over object slide and eye-piece, magnifying power 28 to 30 dia., object glass $1\frac{1}{4}$ inches dia., level tube $7\frac{1}{2}$ inches long, clamp and tangent screw and steel center.

The leveling screws are protected by dust caps and are provided with ball and socket cups.

Weight of instrument, 8 pounds; weight of tripod, about $7\frac{1}{2}$ pounds.

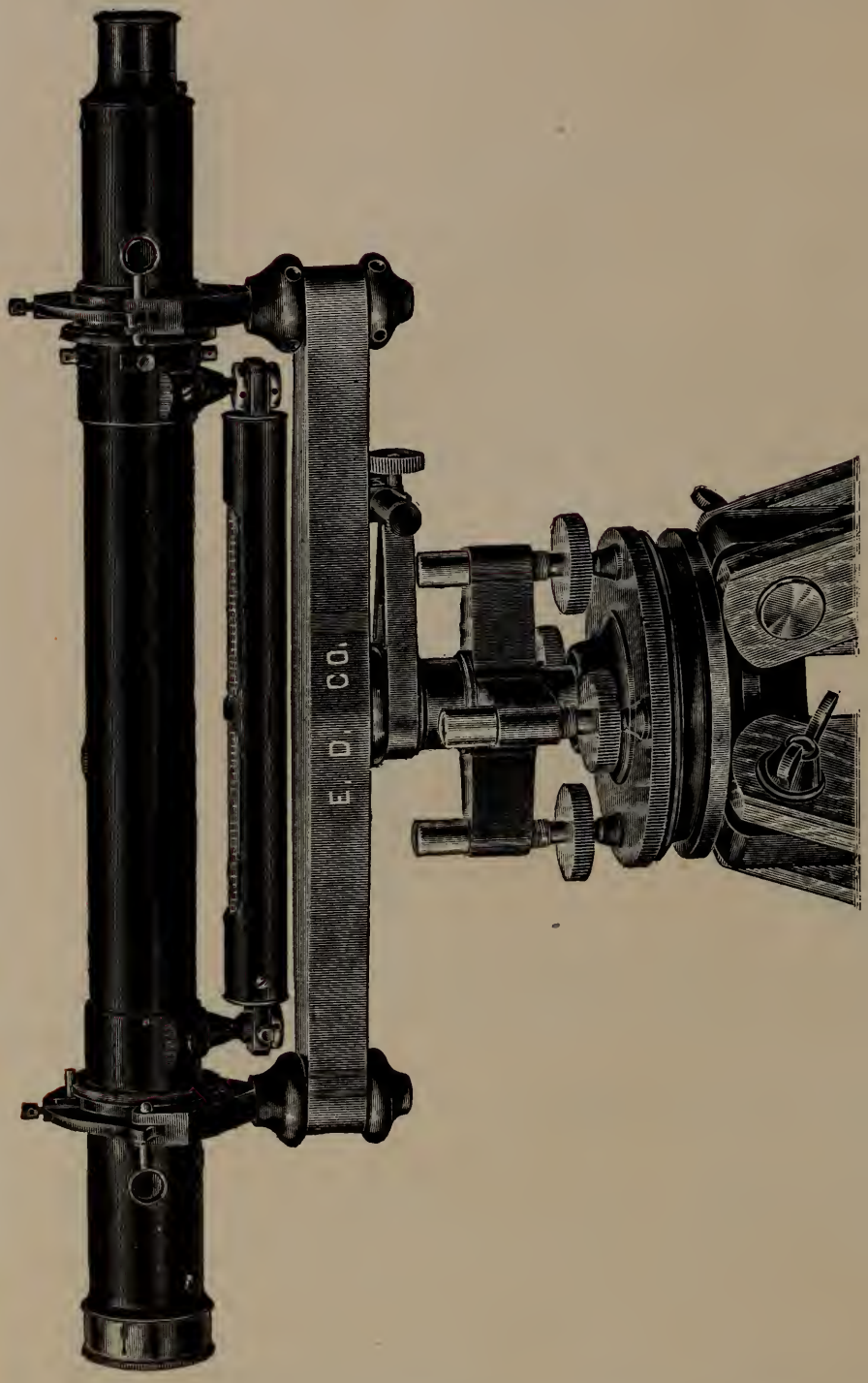
No. 6025.	Engineers' Dumpy Level, with 15 inch telescope, erecting eye-piece, including tripod No. 6204, box, etc., complete, ...	Each,	$110 00
6026.	Same as above, but **without** tangent screw, . .	"	100 00
6027.	Same as **6025,** but with 18 inch telescope, . .	"	120 00

The above Levels with inverting eye-piece, made to order without additional charge.

For Repairs, see page 403.

ENGINEERS' Y LEVEL

Each Instrument of our make is warranted to be first-class in every particular.



No. 6030.

No. 6030. Engineers' Y Level, 18-inch, as described on next page, with steel center, complete, with tripod No. 6204, box, etc., ... Each, $140 00

6031. The same as above, but with reversion level, ... " 150 00

For lower priced Instruments, see "Standard" Y Levels, Nos. 6130-6134.

ENGINEERS' Y LEVEL *Continued*

No. 6030. Engineers' Y Level: The main qualities to be secured in a Level are stability, a powerful telescope, and a sensitive bubble. In regard to the first point, an examination of the cut will suffice to show that this has been accomplished in a most perfect manner.

The upper parallel plate is of extra large diameter, enabling the application of a more sensitive bubble than is generally found. The center is very long, extending from the bar to the bottom of the lower parallel plate, and is made of steel, which, it is evident, adds to the strength of the instrument and also increases its accuracy and stability. The liability of bending the spindle, so common on instruments having brass centers, and the fretting of the same, is altogether avoided by a steel center, and we gladly bear the extra expense in its manufacture. The leveling screws are provided with dust caps and ball and socket cups. The cross bar is 12 inches long, and is made of the best composition metal. The collars are made of the hardest bell metal, and of exactly the same diameter. The telescope is provided with a vertical stop, so as to bring the cross hairs in a true vertical and horizontal position. The object slide and eye-piece are provided with DUST PROTECTORS.

The telescope is of the best definition, 18 inches long, with object glass of $1\frac{3}{8}$ inches diameter, used to its full value; new improved eye-piece, giving a large, flat field, and provided with an improved screw-like focusing arrangement, for precise focusing of cross hairs; magnifying power 33 to 35 diameters. The level vial is eight inches long and highly sensitive. Such a bubble will be of good service only with an instrument perfectly steady, and provided with a powerful and sharply defining telescope.

Weight of this instrument, with tripod, eighteen pounds.

The instrument is packed whole, and stands erect in a nicely finished cherry-wood box, which is provided with lock, hooks, strong leather strap, and contains sun-shade and several adjusting pins. The tripod bolts are also furnished with thumb nuts.

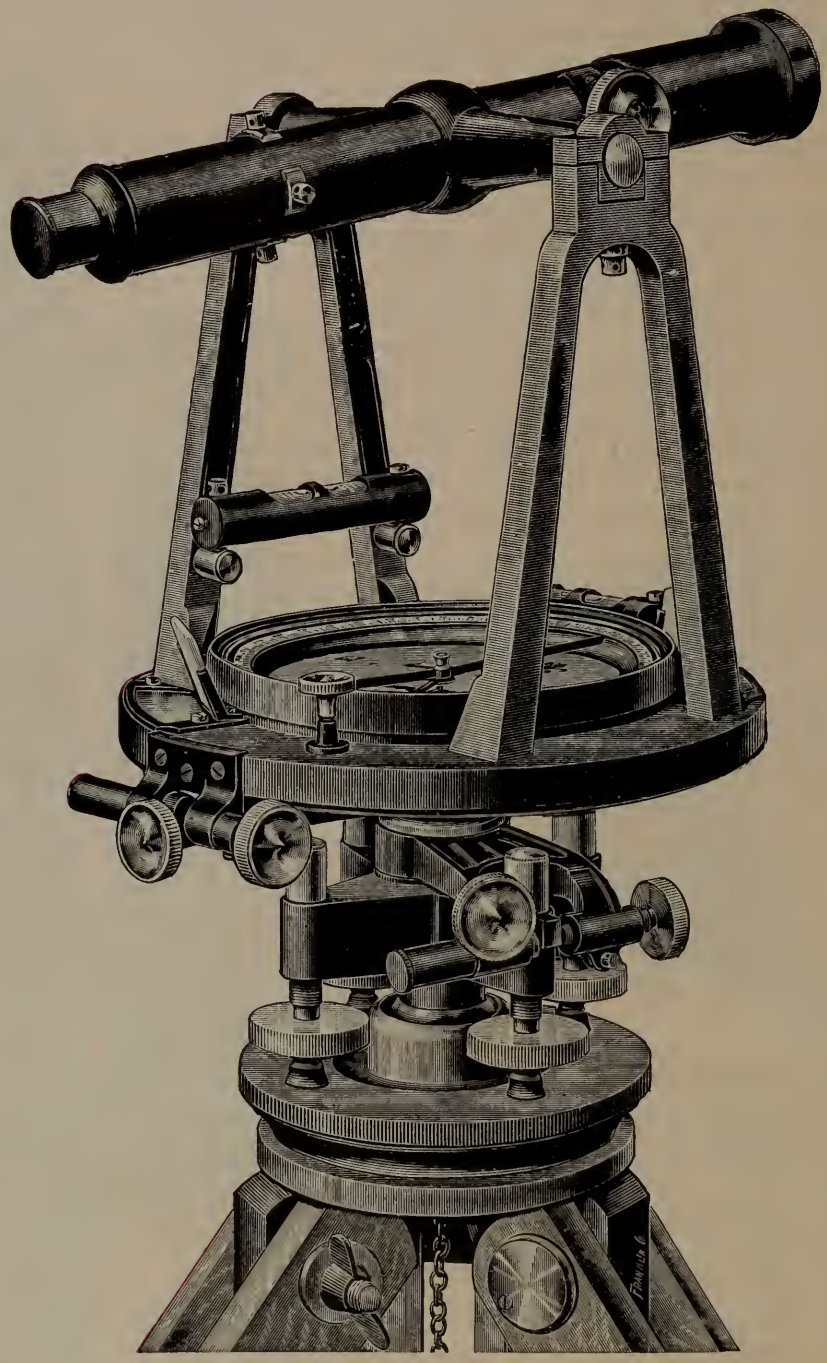
No. 6030.	Complete, with tripod No. 6204, box, etc., . . . Each,	$140 00
6031.	Engineers' Y Level: The same instrument as No. 6030, but with reversion level; complete with tripod No. 6204, box, etc., Each,	150 00
6032.	Engineers' Y Level: The same instrument as No. 6030, but with three leveling screws and extra large tripod head; complete, with tripod No. 6204, box, etc., ... Each,	150 00
6033.	Engineers' Y Level, like No. 6030, but with 20 in. telescope, Each, ...	145 00
6034.	Engineers' Y Level, like No. 6030, but with 22 in. telescope, Each, ...	150 00

Above Levels with inverting eye-piece, made to order without additional charge.

For Lower priced Instruments, see "Standard" Y Levels, Nos. 6130-6134.

ENGINEERS' TRANSIT—PLAIN

Each instrument of our make is warranted to be first-class in every particular.



No. 6035.

No. 6035. Plain Engineers' Transit, as described on next page, complete, with tripod No. 6204, box, etc., ... Each, **$195 00**

For lower priced Instruments, see "Standard" Transits, Nos. 6135-6155.

ENGINEERS' TRANSIT *Continued*

See also General Description, pages 364-367.

The Engineers' Transit No. 6035 is our standard size for general engineering, and will meet the requirements of the highest class of engineering, such as hydraulic, bridge building, city and land surveying. The diameter of limb is 6½ inches to the edge of graduation, with two double (exactly opposite) verniers, reading to single minutes in all instruments kept on hand, with graduations on solid silver. If ordered we can furnish verniers reading to 30, 20 or 15 seconds.

The verniers are placed at an angle of 30° to line of sight, and the graduation is marked with two rows of figures, one reading from 0 to 180 and the other from 0 to 360; the figures are inclined in the direction they are to be read.

The magnetic needle is 4½ inches long. The level vials are ground extra sensitive, and divided to allow a precise leveling up. Improved Tangent Screw to Limb. Shifting centers to set over a given point. New improved telescope 11¼ inches long, with magnifying power of 26 diameters, showing objects erect. Object glass of a full aperture of 1¼ inches. Improved achromatic eye-piece, with abundance of light, and a large flat field. The line of collimation is correct at all distances. The telescope is balanced, and reverses at both ends. OBJECT SLIDE AND EYE-PIECE are provided with DUST GUARDS. The centers are 3½ inches long, with substantial flanges.

The leveling screws are protected by dust caps and are provided with ball and socket cups.

The tripod head as now made by us is of one single casting, the lugs are of extra width and are cast hollow, with a hub left in the center, giving ample bearing for the bolts which fasten the tripod legs.

The legs are made of well-seasoned cherry hardwood, the upper portion being split with a tongue inserted at the top to guard against splitting of the leg.

The bolts are provided with thumb nuts.

In stadia measurements, which method is now more extensively used, especially by railroad engineers in rough country, where it will give better results than chaining, our new telescope will be of special service.

The instrument is securely packed in a nicely finished cherry-wood box, which is provided with a strong leather strap, lock, etc., and contains sun-shade, plumb bob, magnifying glass and several adjusting pins.

Weight of plain Transit No. 6035, with tripod, 21 pounds.

No. 6035. Plain Engineers' Transit, complete, with tripod No. 6204, box, etc., ... Each, $195 00

6036. Plain Engineers' Transit, like No. 6035, but with clamp and tangent screws to telescope axis, . . " 205 00

Above Instruments with inverting eye-piece, made to order without additional charge.

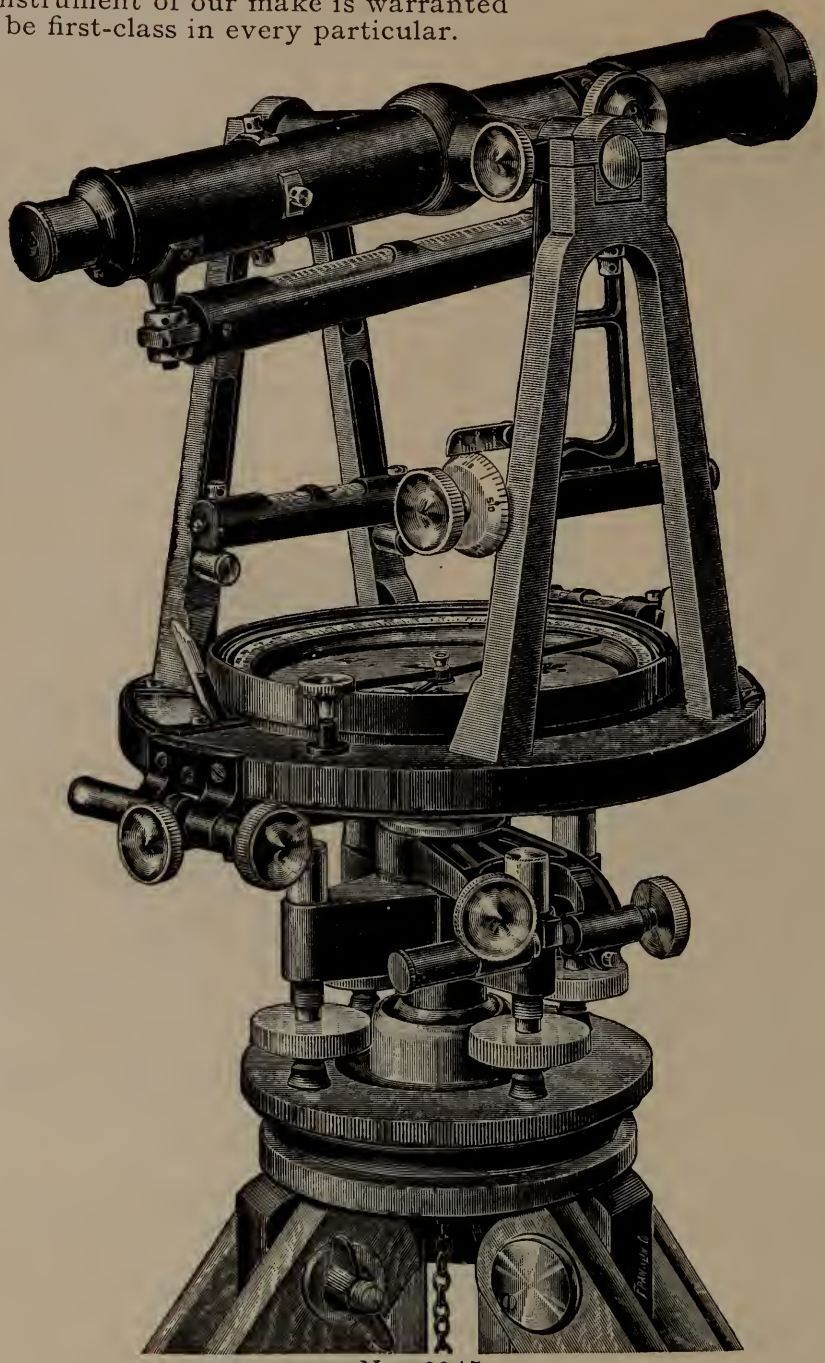
EXTRAS TO PLAIN TRANSIT

Improved Solar Attachment, as described under No. 6168, . . .	$50 00
Vertical Circle, 5 in. diameter, Graduation on Solid Silver, reading to 1 minute, ...	20 00
Vertical Arc, Graduation on Solid Silver, reading to 1 minute, . .	20 00
Level to Telescope, ...	10 00
Reversion Level, ...	20 00
Clamp and Tangent Screw to Axis, ...	10 00
Graduation, reading to 30 seconds, ...	10 00
Graduation, reading to 20 seconds, ...	20 00
Fixed Stadia Wires, to cover 1′ in 100′ on any rod, ...	3 00
Variation Plate, with Rack and Pinion, ...	10 00
Variation Ring, with index point, ...	5 00
Gradienter Screw, ...	4 00
Ground Glass Vernier Shades, ...	3 00
Aluminum Guard for Vertical Circle as shown in cut No. 6066, . .	4 00
Double Opposite Vernier Attachment for Vertical Circle, ...	20 00

ENGINEERS' TRANSIT

WITH LEVEL ATTACHMENT

Each Instrument of our make is warranted to be first-class in every particular.



No. 6045.

No. 6045. Engineers' Transit, with Level Attachment (the description given under No. 6035 also applies to this number), with gradienter screw, fixed stadia hairs, vernier shades, and graduation on solid silver, reading to 30 seconds; complete, with tripod No. 6204, box, etc., . . . Each, $230 00

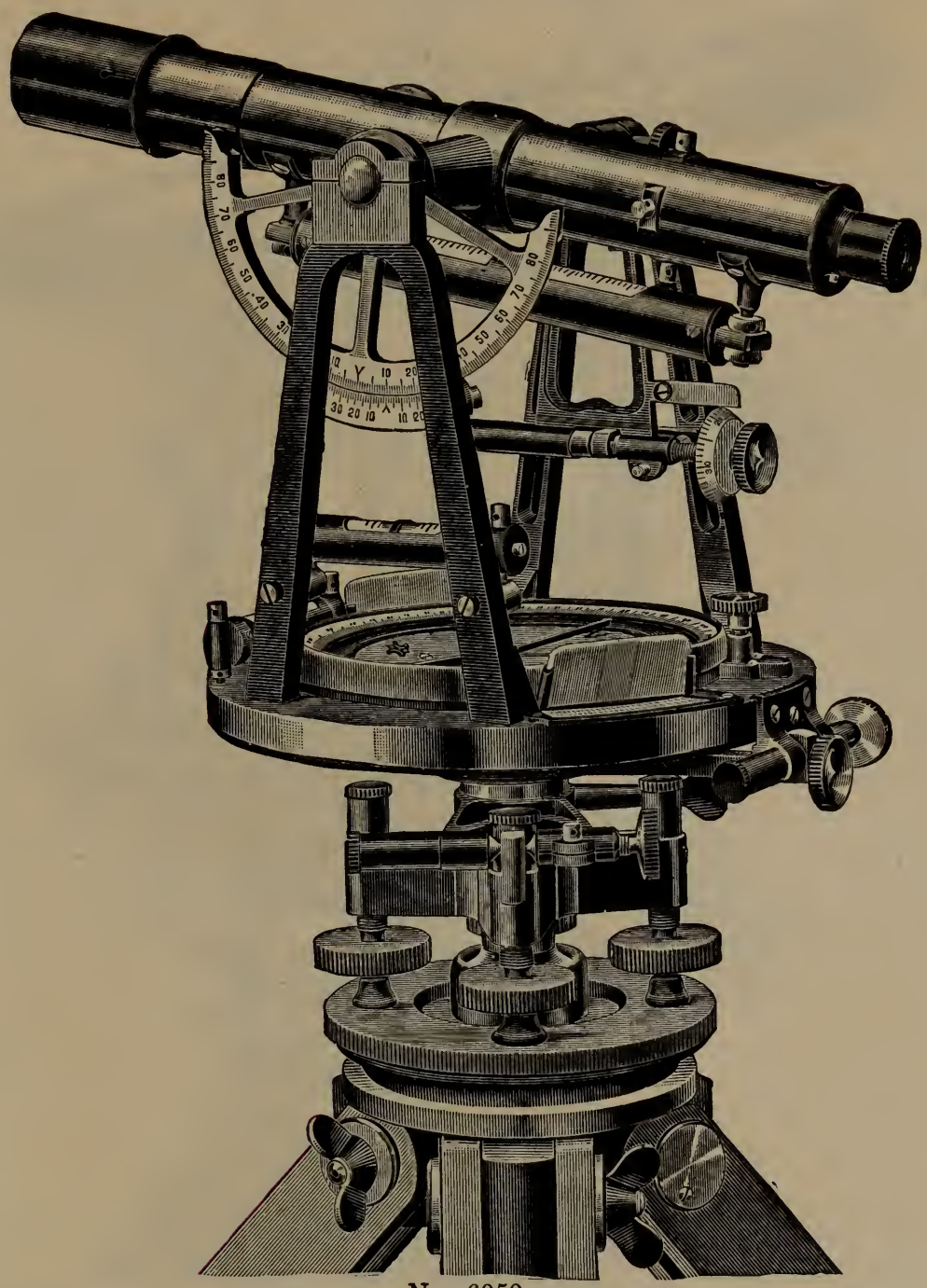
6046. Same as above, with graduation on brass, silvered; complete, with tripod No. 6204, box, etc., ... Each, 220 00

For lower priced Instruments, see "Standard" Transits, Nos. 6135-6155.

ENGINEERS' TRANSIT

WITH LEVEL ATTACHMENT AND VERTICAL ARC

Each Instrument of our make is warranted to be first-class in every particular



No. 6050.

No. 6050. Engineers' Transit with Level Attachment and Vertical Arc, 5 in. diam. (the description given under No. 6035 also applies to this number), with gradienter screw, fixed stadia hairs, vernier shades, graduation on solid silver, reading to 30″; complete, with tripod No. 6204, box, etc., . Each, $245 00

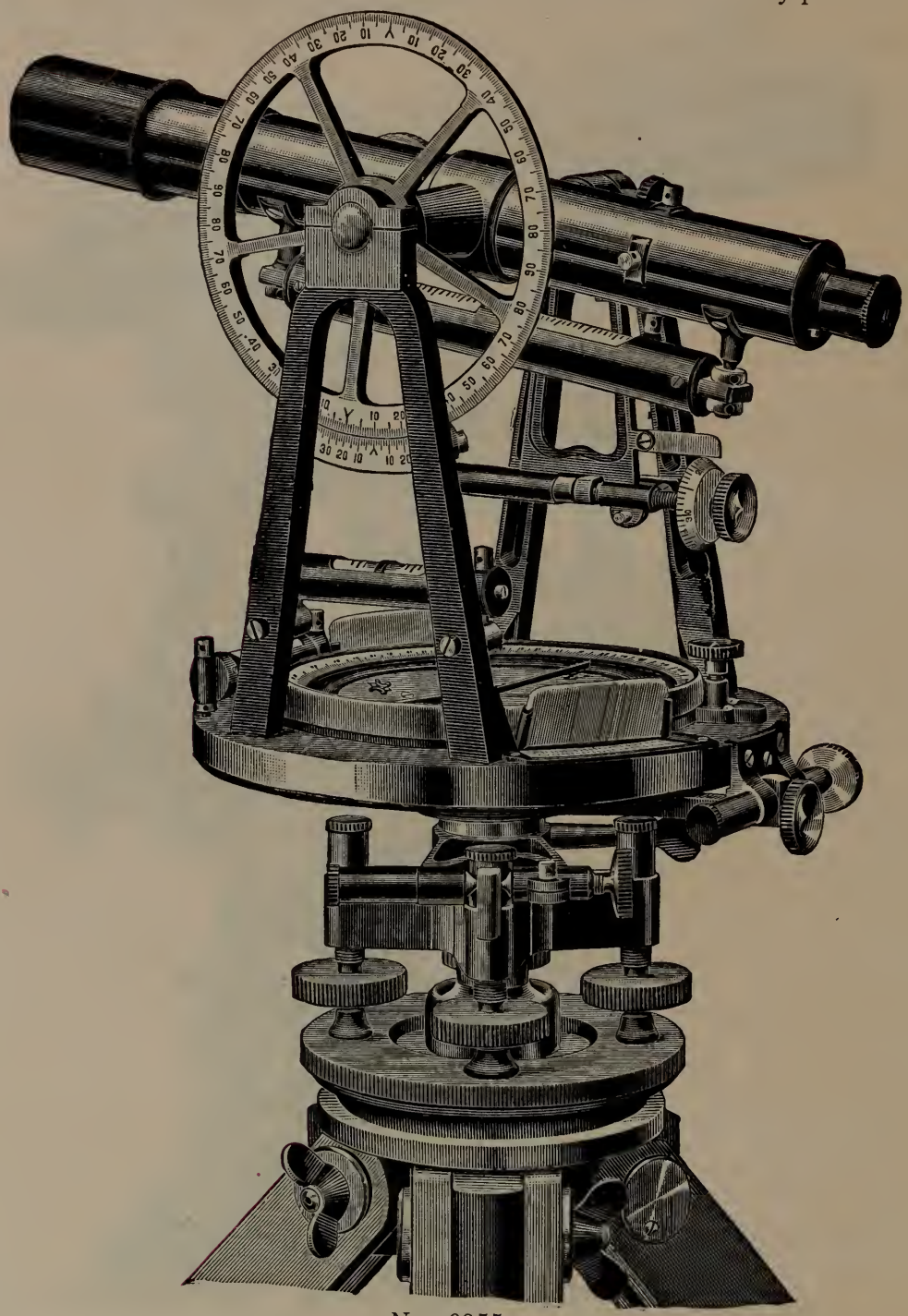
For Description and Extras, see page 377.

For lower priced Instruments, see "Standard" Transits, Nos. 6135-6155.

ENGINEERS' TRANSIT

WITH LEVEL ATTACHMENT AND VERTICAL CIRCLE

Each Instrument of our make is warranted to be first-class in every particular.



No. 6055.

No. 6055. Engineers' Transit with Level Attachment and 5 in. Vertical Circle (the description given under No. 6035 also applies to this number), with gradienter screw, fixed stadia hairs, vernier shades, graduation on solid silver, reading to 30″; complete, with tripod No. 6204, box, etc., . Each, $250 00

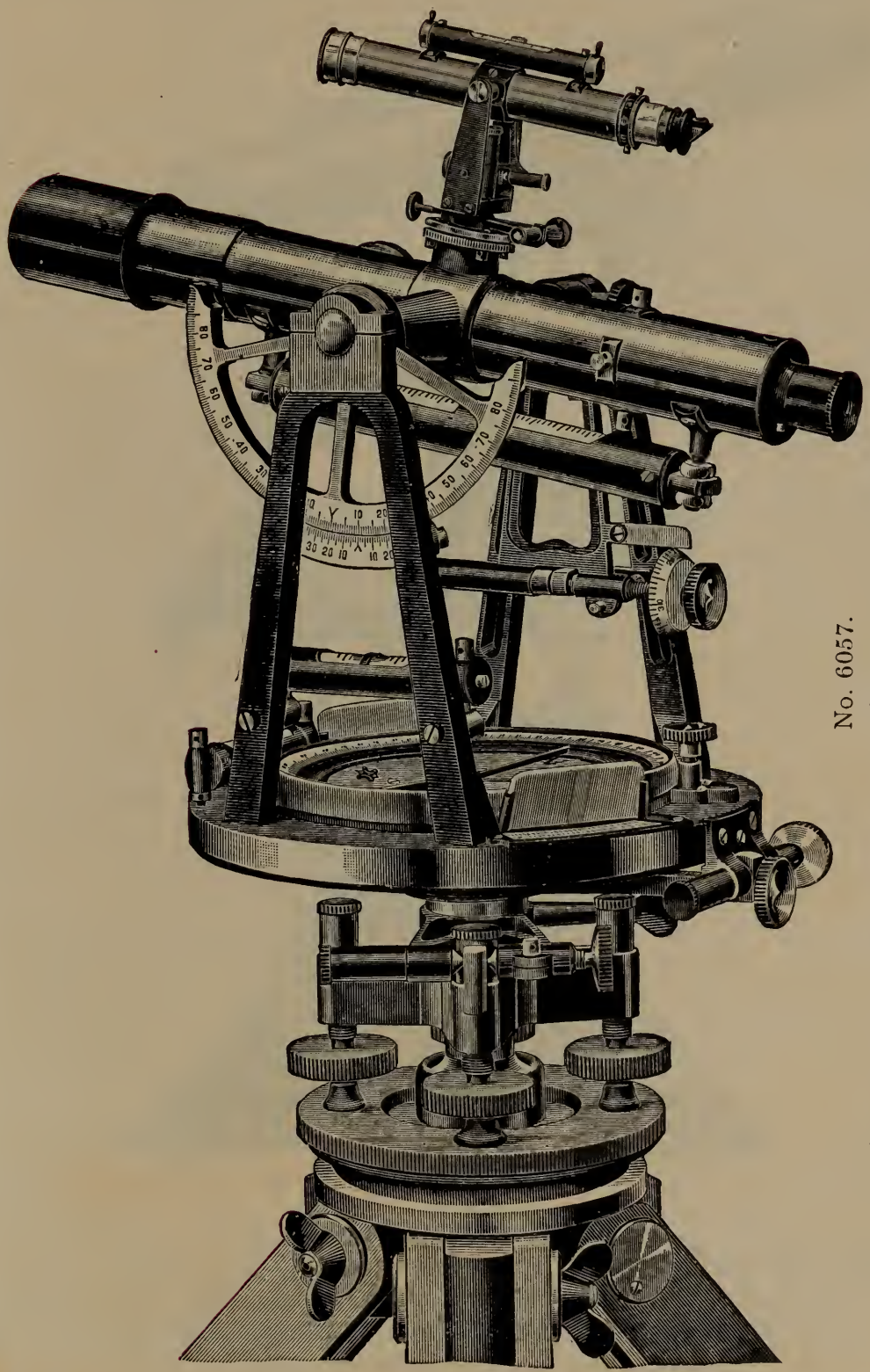
For Description, as well as for Extras, see page 377.

For lower priced Instruments, see "Standard" Transits, Nos. 6135-6155.

ENGINEERS' AND SURVEYORS' TRANSIT

COMPLETE

Each Instrument of our make is warranted to be first-class in every particular.



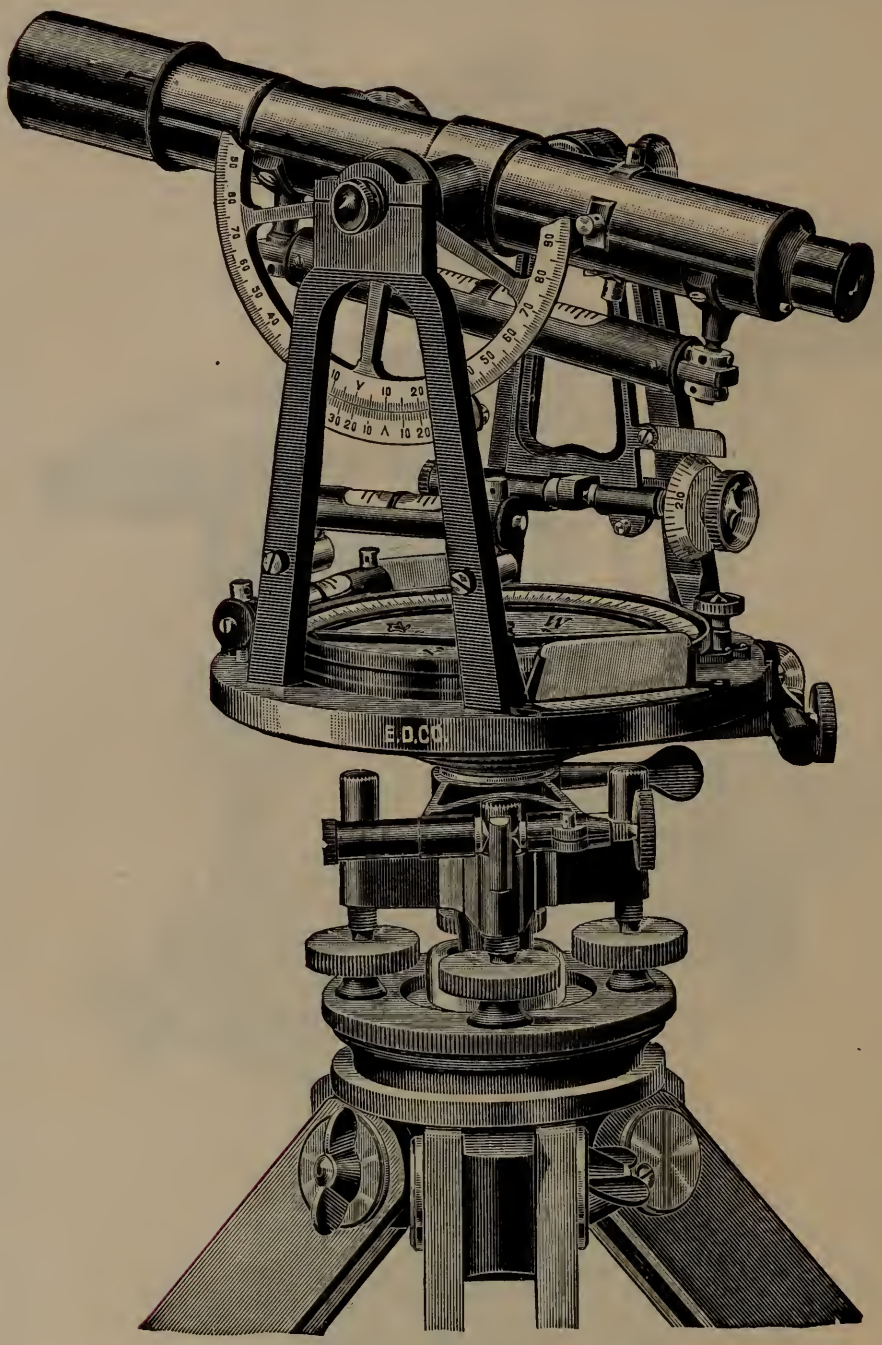
No. 6057.

No. 6057. Engineers' Transit, complete, with vertical arc 5 in. diam., vernier reading to single minutes. Improved Solar Attachment, fixed stadia hairs, gradienter screw and variation plate to needle, complete, with tripod No 6204, box, etc., ... Each, $310 00

For Description and Extras, see page 377.

MOUNTAIN AND MINING TRANSIT

Each Instrument of our make is warranted to be first-class in every particular.



No. 6060.

See description on next page.

No. 6060. Mountain and Mining Transit, with vertical arc, level to telescope, gradienter screw, fixed stadia hairs, graduation on solid silver, complete, with extension tripod No. 6207, box, etc., ... Each, $250 00

MOUNTAIN AND MINING TRANSIT *Continued*

No. 6060. Mountain and Mining Transit (see illustration on preceding page), is of somewhat smaller size but of the same construction as our regular transits described under No. 6035. The different parts of the instrument are executed with the same care and skill as our larger transits, and we can recommend it as a thoroughly reliable instrument. The horizontal limb is 5¼ inches in diameter, graduated to ½ degrees, on solid silver, double opposite verniers reading to single minutes, placed at an angle of 30° to line of sight, 3⅝ inch magnetic needle, variation ring with index point. The telescope is 9½ inches long, object glass 1⅛ in. diameter, fixed stadia hairs, object slide and eye-piece are provided with dust protectors, magnifying power 20 diameters, showing objects erect. The telescope axis is provided with extensions for auxiliary side telescope. There is a level to telescope and vertical arc 2¼ in. radius, reading to minutes. The leveling screws are provided with dust caps and ball and socket cups. The instrument is securely packed in a nicely finished mahogany box, provided with leather strap, and contains plumb bob, reading glass, sun-shade and several adjusting pins; complete, with extension tripod No. 6207, box, etc., ... Each, $250 00

6061. Mountain and Mining Transit, same as No. 6060, but with 4½ in. vertical circle, and aluminum guard; complete, with tripod No. 6207, box, etc., ... Each, 258 00

6062. Mountain and Mining Transit, same as No. 6060, but without vertical arc; complete, with tripod No. 6207, box etc., ... Each, 235 00

6064. Mountain and Mining Transit, same as No. 6060, but without vertical arc, and without level to telescope, and with one vernier shade only; complete, with tripod No. 6207, box, etc., ... Each, 200 00

Weight of instrument No. 6064, 9 pounds.

Weight of tripod, about 6-7 pounds.

Any of the above instruments, with plates and standards made of aluminum and thus reduced in weight about three pounds, at additional price of $25 00.

Above instruments with inverting eye-piece, made to order without additional charge.

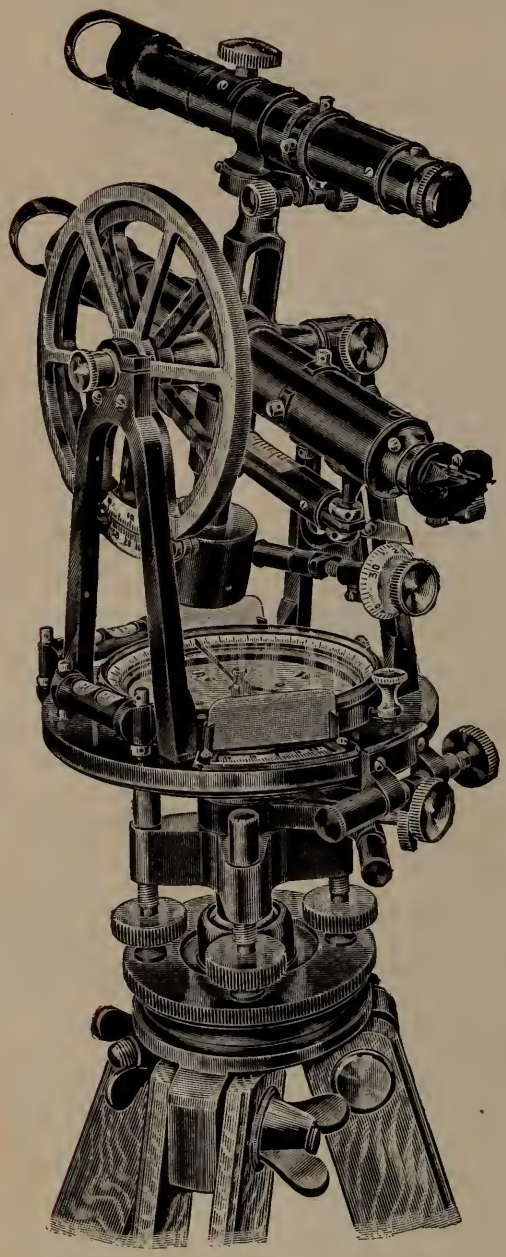
EXTRAS TO MOUNTAIN AND MINING TRANSITS.

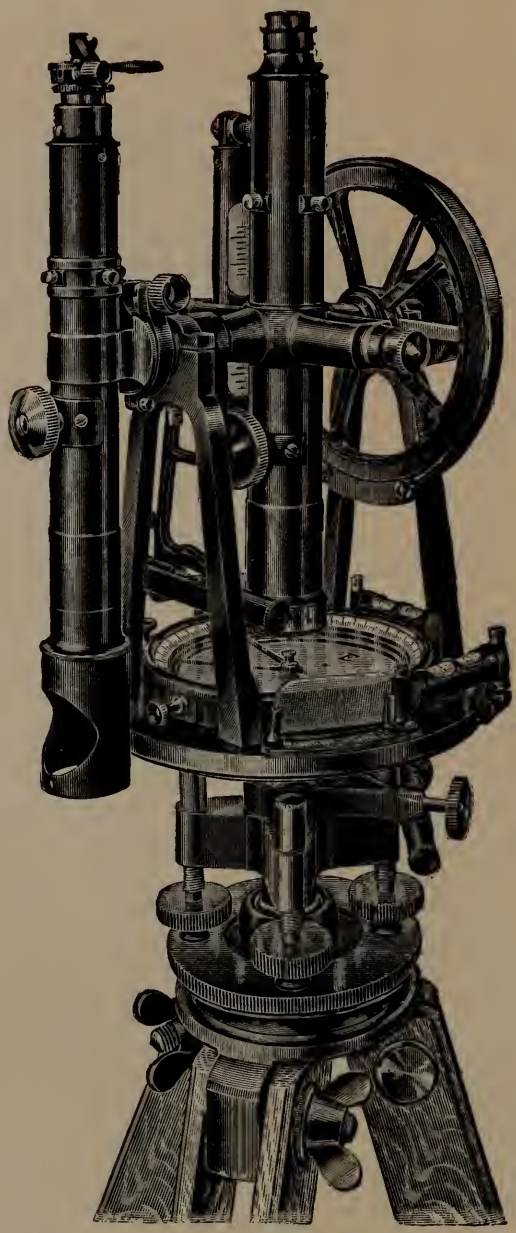
Improved Solar Attachment, as described under No. 6168,	$50 00
Davis Solar Attachment, complete, with prism and sun-shade,	18 00
Auxiliary Side or Top Telescope,	35 00
Vertical Circle, 5 in. diameter,	20 00
Double Opposite Vernier Attachment for vertical circle,	20 00
Detachable Reading Glass for vertical circle,	5 00
Detachable Reading Glasses for horizontal limb,	15 00
Prism, attachable to eye-piece,	8 00
Prism, combination pivoted, with colored glasses,	12 00
Reversion level, in place of ordinary level,	10 00
Gradienter screw,	4 00
Fixed stadia hairs,	3 00
Disappearing stadia hairs,	4 00
Reflector for illuminating cross hairs,	4 00
Colored glass in eye-piece slide,	2 00
Aluminum guard for vertical circle, as shown in cut No. 6066,	4 00
Gossamer Cover for instrument,	1 00
Sole Leather Cover for case, with shoulder straps,	12 00

For Tripods, see Nos. 6200-6215.

MOUNTAIN AND MINING TRANSIT

WITH INTERCHANGEABLE AUXILIARY TELESCOPE.

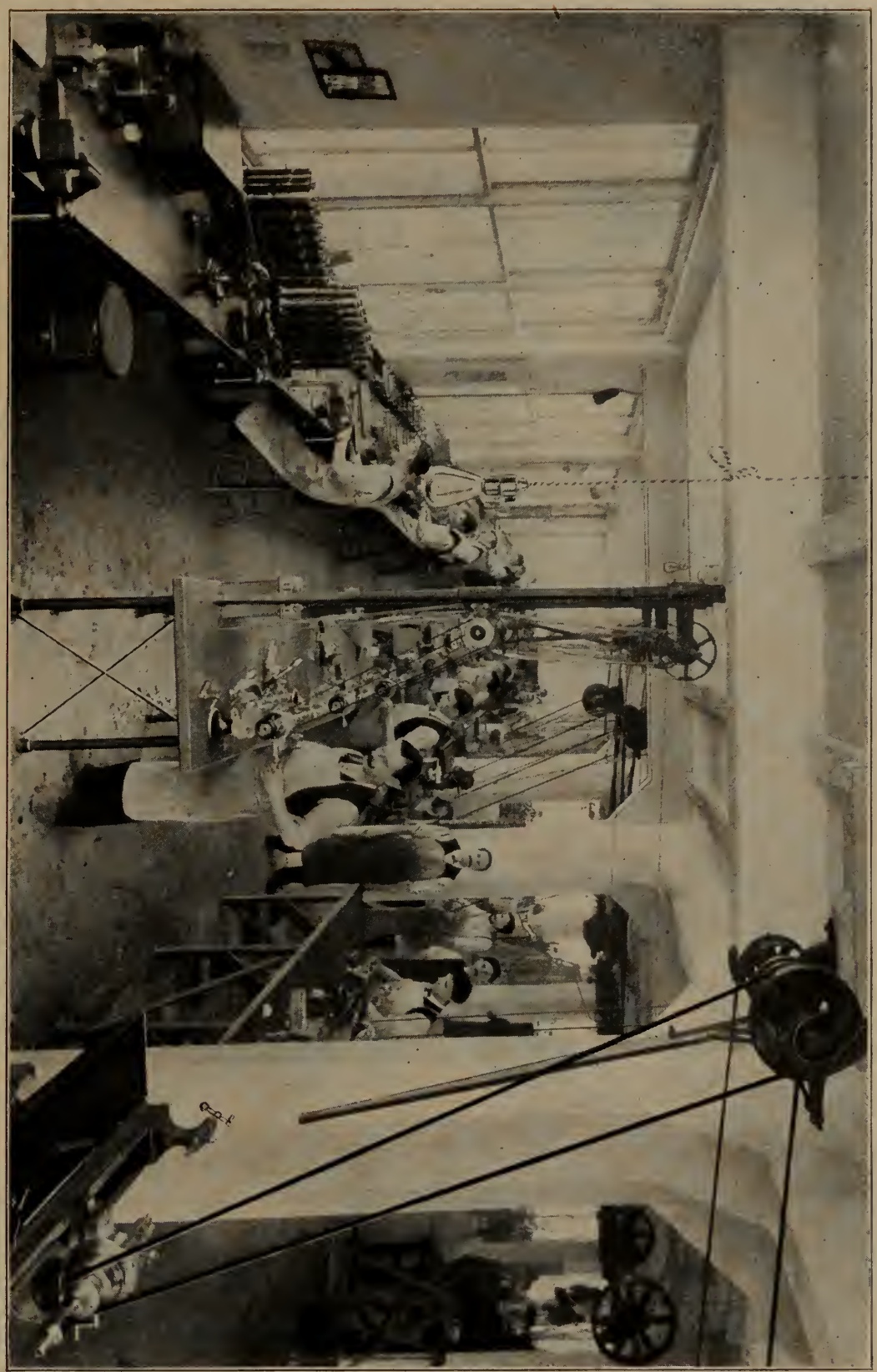




No. 6065½.

No. 6065. Mountain and Mining Transit, with level attachment and vertical circle 4½ in. diam. (the description given under No. 6060 also applies to this number), aluminum guard, gradienter screw, fixed stadia hairs, all graduations on solid silver, ground glass vernier shades; with Berger's Auxiliary Telescope, interchangeable to either top or end of axis of main telescope, with counterpoise, complete, with extension tripod No. 6207, box, etc., ... Each, $300 00

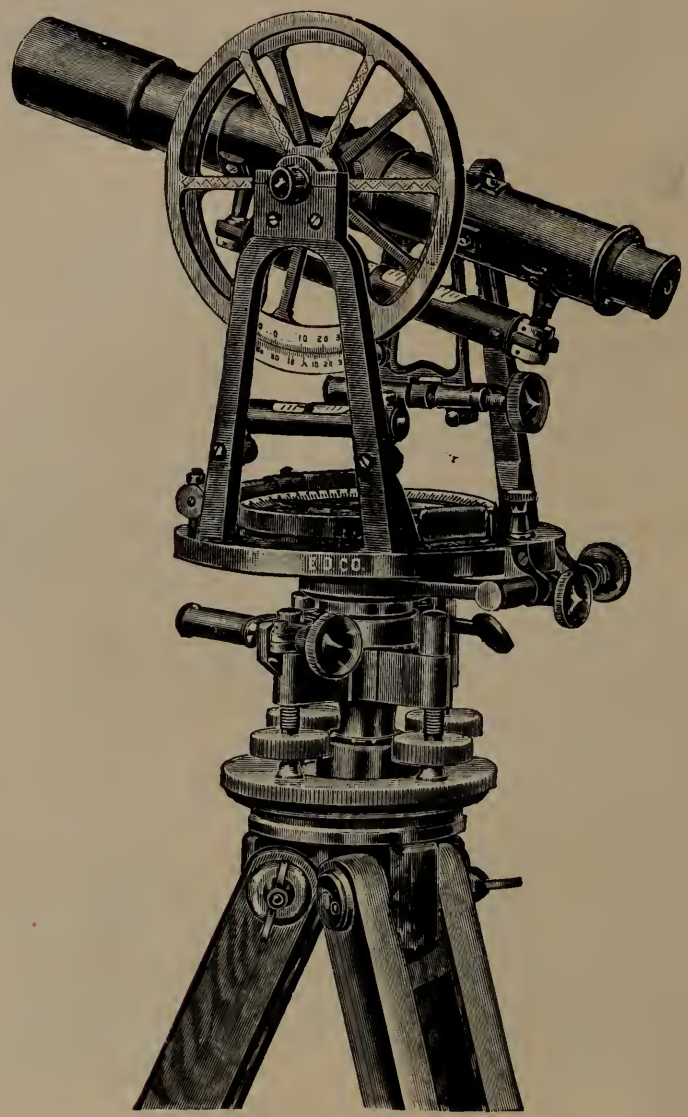
6065½. Mountain and Mining Transit, same as No. 6065, but with reflectors for illuminating cross hairs of main and auxiliary telescopes and pivoted prism with colored glasses, Each, 320 00



SURVEYING INSTRUMENTS — TELESCOPE DEPT. — FACTORY

LIGHT MOUNTAIN AND MINING TRANSIT

Each Instrument of our make is warranted to be first-class in every particular.



No. 6066.

See description on next page.

No. 6066. Light Mountain and Mining Transit, with vertical circle, aluminum guard, level to telescope, vernier shades, fixed stadia hairs, graduation on solid silver, variation ring to needle; complete, with light extension tripod No. 6208, box, etc., ... Each, $235 00

LIGHT MOUNTAIN AND MINING TRANSIT *Continued*

Light Mountain and Mining Transit No. 6066 (see illustration on preceding page), represents a complete mountain transit of its kind, the general construction is in every respect the same as our larger instruments differing only in size and weight.

The important parts such as the centers and the telescope axis are made extra strong so as to permit of attaching a side, or top telescope if desired and to bring the instrument more within the range of the larger mining transit.

The 4¼ in. horizontal limb is graduated to ½ degrees, on solid silver and is read by two double opposite verniers to single minutes; the circle has two rows of figures, the inside row is numbered into quadrants and the outside row from 0 to 360.

The vernier openings are at an angle of 30° to line of sight. The compass needle is 3 in. long, variation ring with index point, and the vertical circle 4¼ in. diameter and is protected with an aluminum guard. The erecting telescope is 7½ in. long, has a magnifying power of 16 dia., is provided with dust guard over object slide and a 4 in. sensitive level. The telescope axis is provided with extensions for auxiliary side telescope. The instrument is furnished with improved clamp and tangent screws; has shifting center and is securely packed in a highly finished case which is provided with hooks, leather strap, etc., and contains sun-shade, plumb bob and several adjusting pins.

Weight of instrument, 5½ pounds.

Weight of light extension tripod with thumb nuts, 5 pounds.

No. 6066. Light Mountain and Mining Transit, with vertical circle 4¼ in. diam., aluminum guard, level to telescope, ground glass vernier shades, fixed stadia hairs, all graduations on solid silver, variation ring to needle, complete, with light extension tripod No. 6208, box, etc., ... Each, $235 00

6068. Light Mountain and Mining Transit, same as No. 6066, but with Berger's Auxiliary telescope, interchangeable to either top or end of axis of main telescope, with counterpoise, complete with light extension tripod No. 6208, box, etc., Each, 285 00

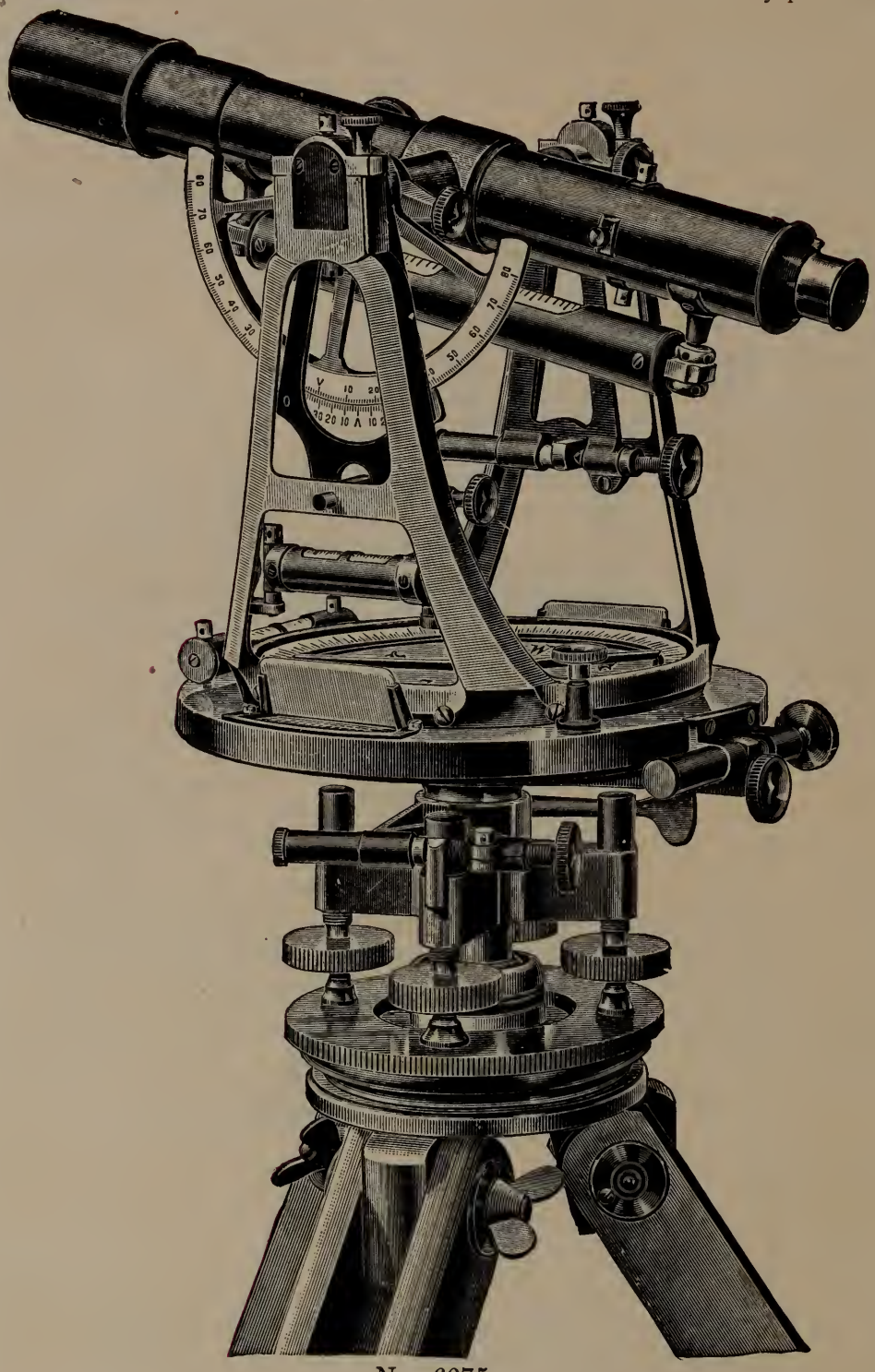
Above instruments with inverting eye-piece, made to order without additional charge.

EXTRAS TO LIGHT MOUNTAIN TRANSIT.

Auxiliary Side or Top Telescope, ...	$35 00
Double Opposite Vernier Attachment for vertical circle, ...	20 00
Detachable Reading Glass for vertical circle, ...	5 00
Detachable Reading Glasses for horizontal limb, ...	15 00
Prism, attachable to eye-piece, ...	8 00
Prism, combination pivoted, with colored glasses, ...	12 00
Reflector for illuminating cross hairs, ...	4 00
Colored glass in eye-piece slide, ...	2 00
Gossamer Cover for instrument, ...	1 00
Sole Leather Cover for case, with shoulder straps, ...	11 00

TRANSIT THEODOLITE

Each Instrument of our make is warranted to be first-class in every particular.



No. 6075.

No. 6075 Transit Theodolite, for use in cities, tunnels, and for triangulation (see description on next page); complete, ... Each, $300 00

TRANSIT THEODOLITE *Continued*

This instrument, as shown in the accompanying engraving, has been designed for the highest class of engineering work, for use where instruments of ordinary construction fail to give satisfaction or do not permit of rapid work, where the highest degree of accuracy is desired. The telescope standard is of a new design, it is circular in form and is made of one solid casting, which still preserves the 4½ in. compass needle to the instrument.

The uprights are well ribbed, which gives great lateral strength and permits the use of cylindrical bearings for the telescope axis; this assures to the telescope the most perfect motion in the vertical plane. The caps, which hold the telescope axis in its bearings, are provided with an adjusting screw with which the desired amount of friction can be applied so as to hold the telescope in any position, and are also so arranged to exclude all dust from the bearings.

The horizontal circle is 6¼ in. diameter, is graduated on silver, and is read by two double exactly opposite verniers to 30″. The telescope is 11½ in. long, object glass 1¼ in. aperture, magnifying power 26 dia., showing objects *erect*, the object slide is provided with dust guard. Extra sensitive level to telescope, improved clamp and tangent screws, and covered graduation. The vernier opening can be placed parallel to line of sight, or at right angles as shown in cut. The 5 in. vertical arc is provided with movable vernier and tangent screw.

No. 6075. Transit Theodolite (see illustration on preceding page), has 5 in. vertical arc, reversible clamps, level to telescope, vernier shades, fixed stadia hairs, and all graduations on solid silver; complete, with tripod No. 6204, box, etc., Each, $300 00

6076. The same instrument furnished with three leveling screws and shifting center; complete. . . . . Each, 310 00

Weight of instruments Nos. 6075 and 6076, complete, 13½ pounds.

6077. Plain Transit Theodolite without vertical circle, but with level to telescope and clamp and tangent screws to telescope; complete, ... Each, 270 00

The above instruments with inverting eye-piece, made to order without additional charge.

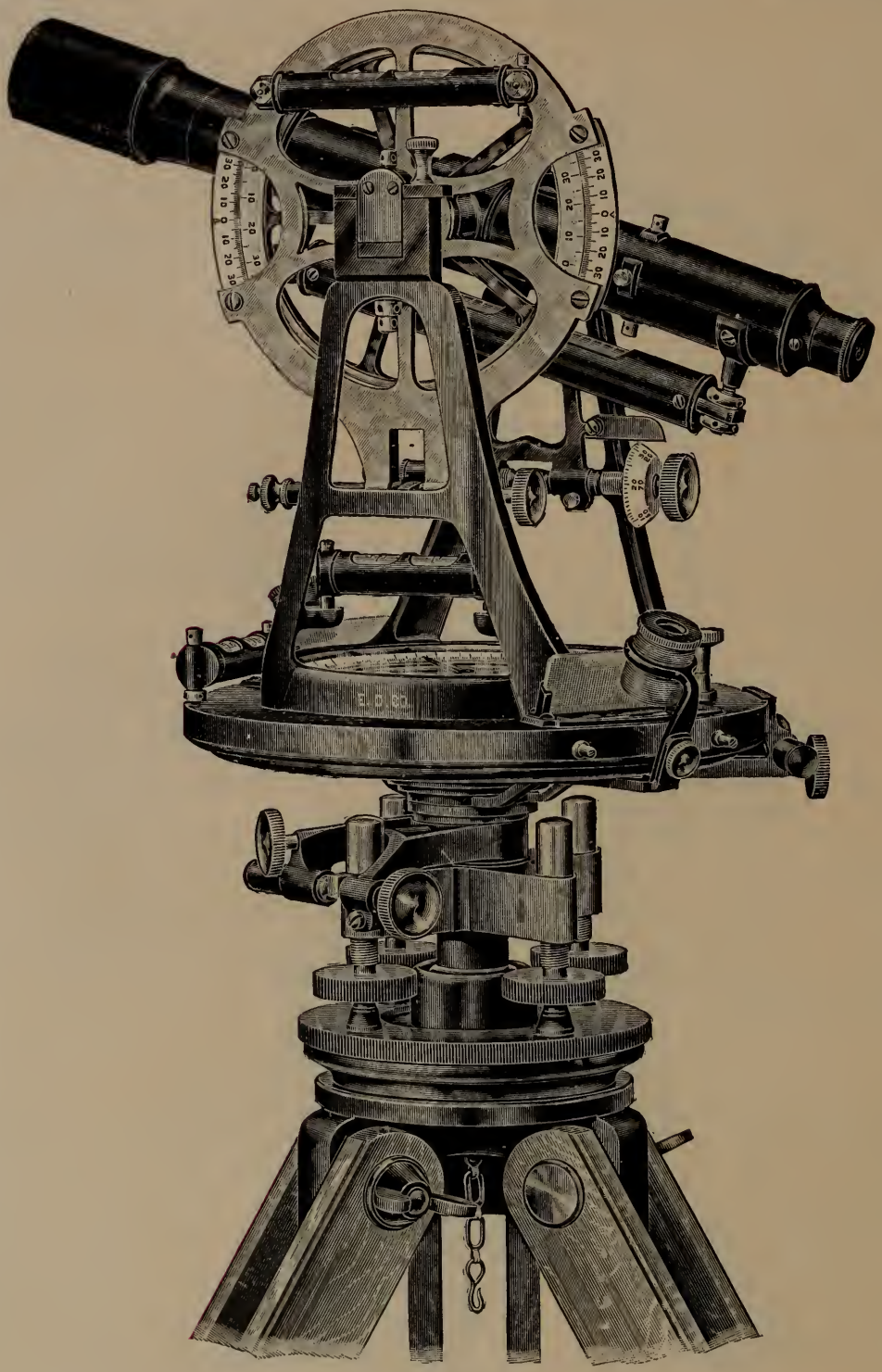
EXTRAS TO TRANSIT THEODOLITE

Full 5 in. Vertical Circle, graduated on silver, reading to minutes, . .	$25 00
Full 5 in. Vertical Circle, double verniers, reading to minutes, . . .	40 00
Graduation on Horizontal Limb, reading to 20″, ...	10 00
Graduation on 7 in. Horizontal Limb, reading to 10″, ...	30 00
Reversion Level, in place of ordinary level, ...	10 00
Attached Reading Glasses to Verniers, ...	15 00
Striding Level, ...	15 00
Gradienter Screw, ...	4 00
Gossamer Cover for Instrument, ...	1 00

For Tripods, see Nos. 6200-6215.

COMPLETE TRANSIT THEODOLITE

Each Instrument of our make is warranted to be first-class in every particular.



No. 6078.

No. 6078. Complete Transit Theodolite (see description on next page), with tripod No. 6204, mahogany case, etc., . . Each, $350 00

COMPLETE TRANSIT THEODOLITE *Continued*

This instrument is designed for the most accurate triangulation as well as for the highest grade of topographical work. The general construction is similar to our No. 6075, but the horizontal limb is 7 in. diameter to edge of graduation, divided into 10 minute spaces on solid silver, with double opposite verniers reading to 10 seconds; the vernier openings are extra large, placed at an angle of 30° to line of sight, are covered with polished plate glass and are provided with ground glass shades. The graduation is read by two detachable reading glasses.

The vertical circle is 6 in. diameter and is provided with aluminum guard, two opposite verniers reading to 20 seconds and a sensitive level for the control of the zero point.

The erecting telescope is 11½ in. long, object glass 1⅜ diameter, magnifying power 28 diameters, 6 in. sensitive level with reversible clamp and gradienter screw to telescope.

The plate levels are divided and have a sensitiveness of 30 seconds for $\frac{1}{12}$ in. on the scale.

The instrument as illustrated is provided with four leveling screws, split-leg tripod and shifting center.

No. 6078. Complete Transit Theodolite, with four leveling screws, shifting center, fixed stadia hairs, all graduations on solid silver, in finely finished mahogany case, with tripod No. 6204, ... Each, $350 00

6079. Same instrument furnished with three leveling screws and shifting center, complete, ... Each, 365 00

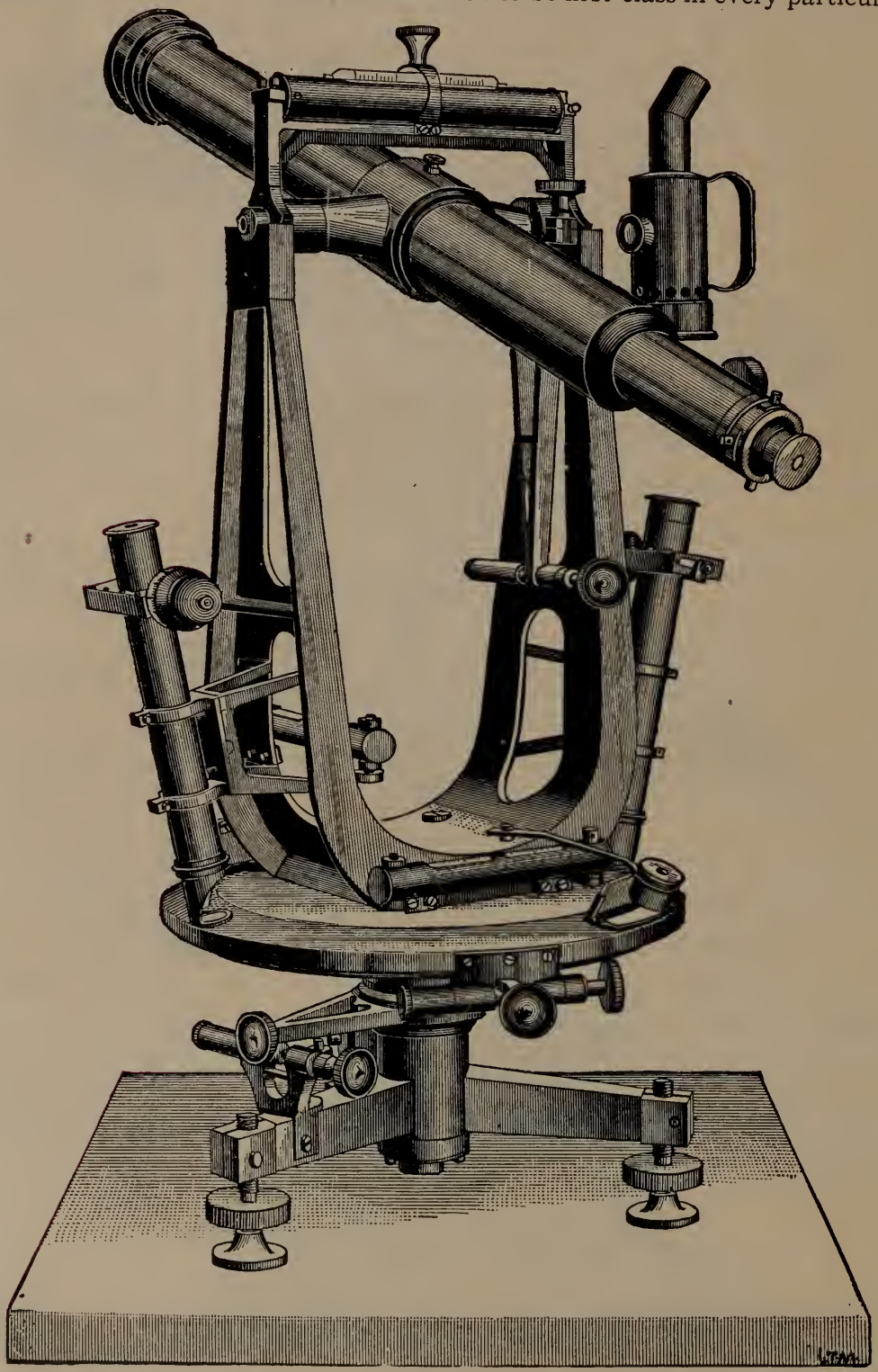
The above instruments can be furnished with inverting eye piece without additional charge.

EXTRAS TO TRANSIT THEODOLITE.

Reversion Level in place of Plain Level, ...	$10 00
Striding Level to Horizontal Axis, ...	15 00
Attached Reading Glasses to Vertical Circle, ...	8 00
Gossamer Cover for Instrument, ...	1 00

REPEATING THEODOLITE—10-INCH

Each Instrument of our make is warranted to be first-class in every particular.



No. 6080.

No. 6080. Repeating Theodolite, 10 in. (see description on next page); complete, in box, ... Each, $700 00

REPEATING THEODOLITE—10-INCH *Continued*

Cut No. 6080, represents a 10 in. Theodolite for triangulation. This instrument is of superior construction. The center, which carries the vernier plate and standard, is made of phosphor bronze, 7 in. long, and is provided with a hardened steel point which rests on a bell metal socket to insure a perfectly easy and true motion. The horizontal limb is 10 in. in diameter to edge of graduation, divided on silver in 10 minute spaces, and is read by two double opposite verniers to 10 seconds, and by two micrometer microscopes to single seconds.

The graduation is numbered from 0 to 360 for every degree.

The standard, which is cast in one piece, rests direct on the flange of inside center, and is high enough to let the telescope swing through, as well as to reverse over the bearing.

The telescope is provided with IMPROVED CLAMP, object glass, 24 in. focus, and 2 in. clear aperture, two Ramsden eye-pieces with magnifying power of 45 and 72 diameters respectively.

The 7 in. striding level is chambered and reads to seconds, and rests on the pivots of telescope axis. The cross hairs are illuminated through the horizontal axis. The instrument is provided with three leveling screws; the general construction and distribution of metal is such as to insure the utmost stability with the least weight.

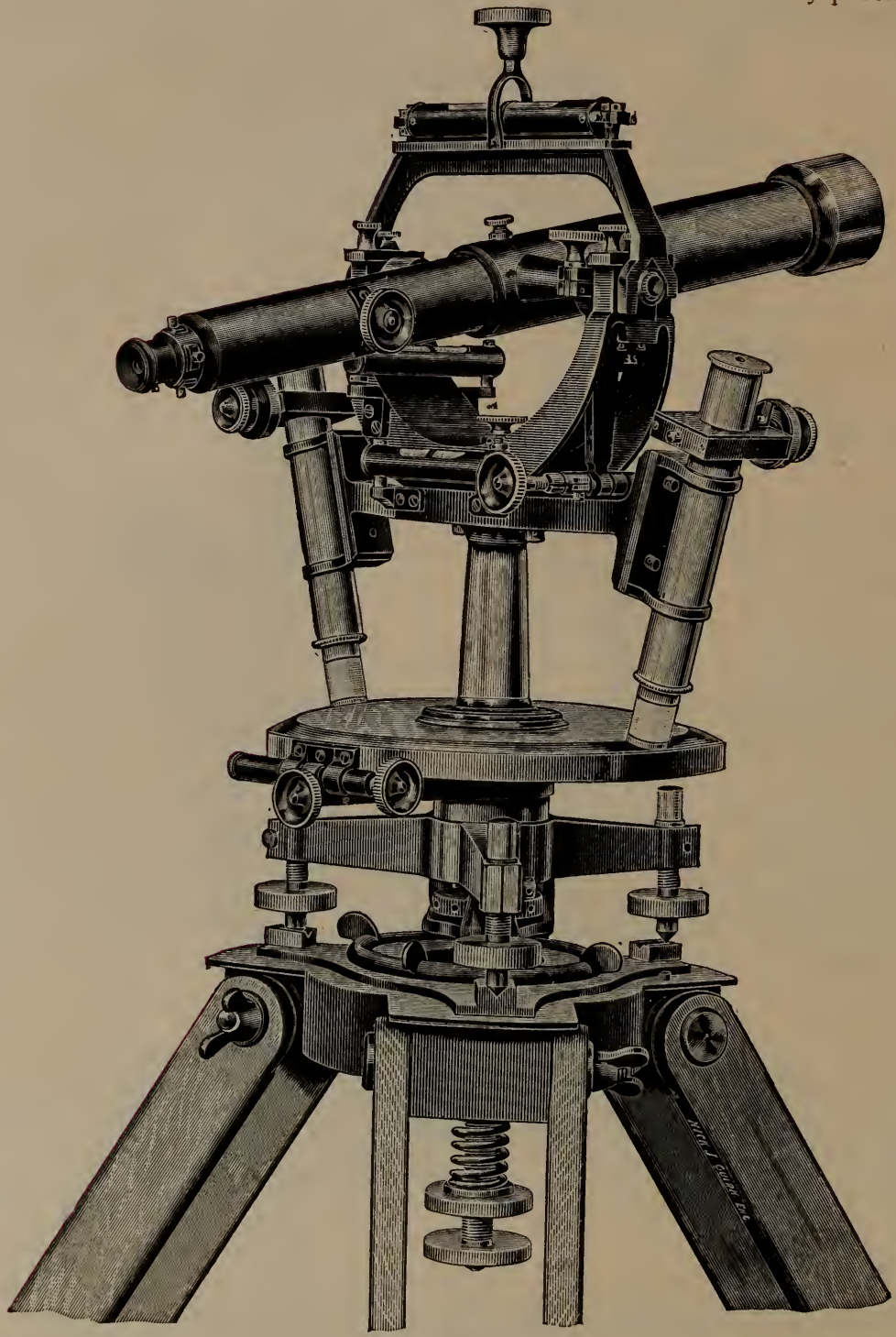
No. 6080. Repeating Theodolite, 10 in., graduation covered, two Ramsden eye-pieces, packed complete in a nicely finished case, with all accessories, ... Each, $700 00

6081. Repeating Theodolite, the same as above, No. 6080, but without micrometer microscopes, ... Each, 550 00

The price for EXTRAS, such as vertical circle, diagonal eye-piece, eye-piece micrometer, etc., quoted on application.

DIRECTION THEODOLITE

Each instrument of our make is warranted to be first-class in every particular.



No. 6085.

No. 6085. Direction Theodolite, 8 in. (see description on next page), complete in box with all accessories, ... Each, $450 00

DIRECTION THEODOLITE *Continued*

This instrument, as shown in illustration, is an 8 in. Theodolite, especially adapted for triangulation and is a non-repeater. The circle, however, is so arranged that different parts of the graduation can be brought under the reading microscopes so that the same angle may be read from various portions of the circle.

The 8 in. limb is graduated into 10 minute spaces; each degree is numbered with a very minute figure from 1 to 360, and is read by two opposite micrometer microscopes to seconds. The graduation is entirely covered, and is only visible through the microscopes.

The 18 in. terrestrial telescope has an object glass of 1½ in. aperture, with a magnifying power of about 35 diameters, and is supported by a strong horizontal axis, which rests in strong yoke with V-shaped bearings; these bearings are provided with sliding caps, which impart a little friction to the telescope axis.

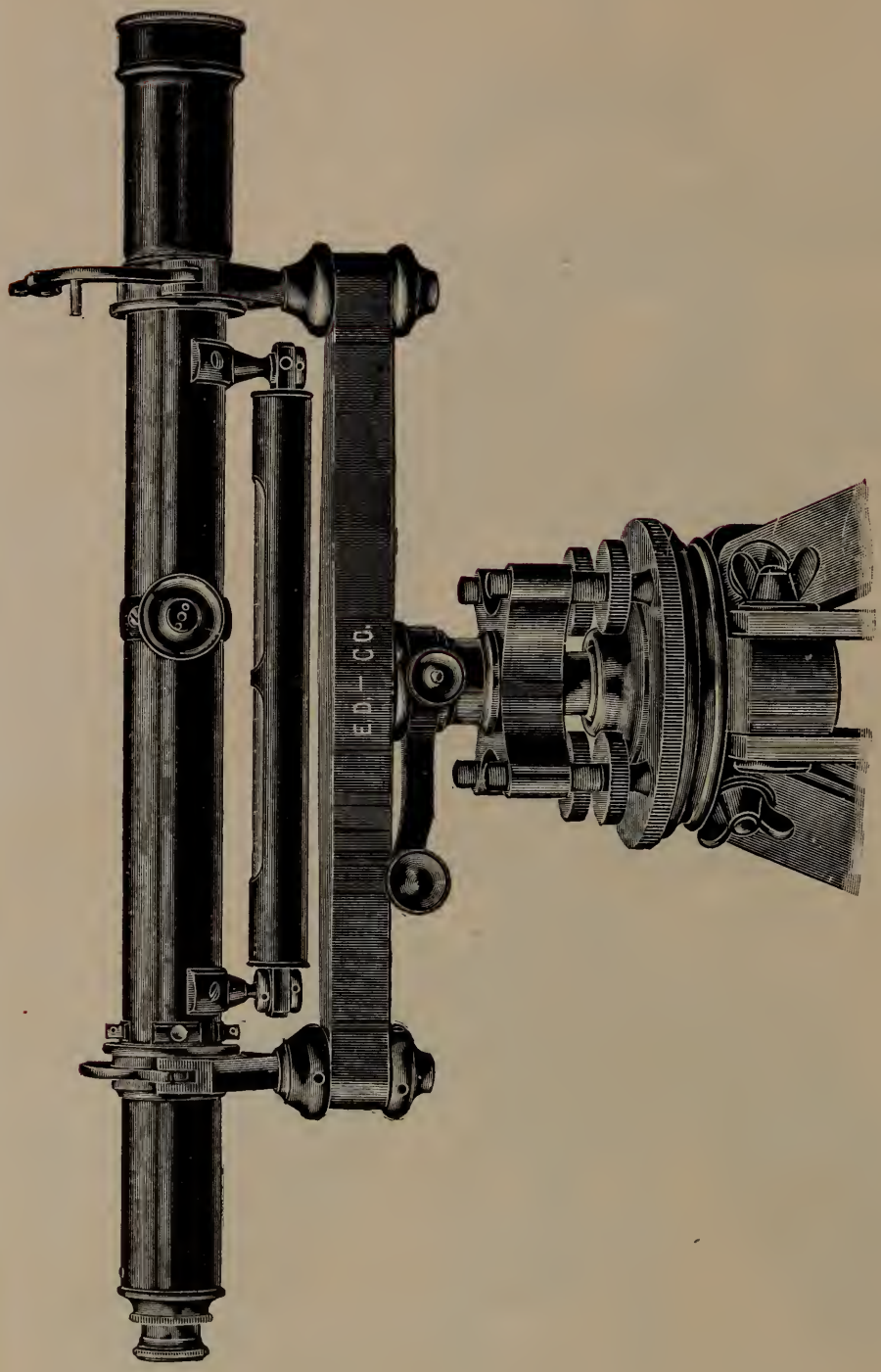
The striding level rests directly on the telescope bearings, is extra long and very sensitive. The telescope axis is provided with an improved reversible clamp and prismatic field illumination.

Another feature not usually found with instruments of this class is the large shifting center tripod, so arranged that the instrument can be brought exactly over the point and firmly clamped.

The instrument is furnished with the usual accessories, sun-shade, extra heavy plumb bob and adjusting pins.

No. 6085. Direction Theodolite, 8 in., graduation covered, packed complete in strong and nicely finished mahogany case, with all accessories, ... Each, $450 00

"STANDARD" ENGINEERS' Y LEVEL



No 6130.

No. 6130. "Standard" Engineers' Y Level, 18 in. telescope, as described on next page; complete, with split-leg tripod, box, etc., ... Each, $110 00

6132. "Standard" Engineers' Y Level, 15 in. telescope, complete, ... " 100 00

For our highest grade Engineers' Y Levels, see Nos. 6030-6034.

THE "STANDARD" Y LEVEL

No. 6130. This is a very substantially made instrument, and is best adapted to a class of work that does not require the highest degree of accuracy, such as railroad work and ordinary land surveying. To distinguish this instrument from our regular and higher grade, we have adopted the name "Standard."

Upon examining the illustration, it will be noticed that simplicity in design and labor saving finish have been the principal points in view to accomplish the desired end.

The achromatic terrestrial telescope is 18 in. long, the object glass $1\frac{3}{8}$ in. aperture, magnifying power 32 diameters. The object slide is moved by rack and pinion, and is provided with dust guard, sun-shade and dust cap. The eye-piece is focused in a screw-like manner and the telescope is arranged with vertical stop to keep the cross hairs in a truly horizontal and vertical position. The level tube is 8 in. long and level bubble is graduated on the glass.

The telescope rings which rest in the Y's and the extra strong center, are made of the hardest bell metal. The cross bar is made of gun metal, cast hollow and strongly ribbed to combine lightness with great strength.

The instrument is provided with clamp and compensating spring, tangent screw and four leveling screws, and does not detach above the leveling screw head. It packs whole and stands in the case erect.

The hardwood case is nicely finished, and contains sun-shade, screw driver and several adjusting pins.

No. 6130. Standard Y Level, 18 in. telescope, complete with split-leg tripod, box, etc., ... Each, $110 00

6132. Standard Y Level, like No. 6130, but with 15 in. telescope, Each, ... 100 00

6133. Standard Y Level, like No. 6130, but with 20 in. telescope, Each, ... 115 00

6134. Standard Y Level, like No. 6130, but with 22 in. telescope, Each, ... 120 00

For our highest grade Engineers' Y Levels, see Nos. 6030-6034.

"STANDARD" ENGINEERS' TRANSIT—PLAIN

No. 6135.

No. 6135. Standard Engineers' Transit, Plain, as described on next page, complete with split-leg tripod, box, etc., . Each, $150 00

For our highest grade Engineers' Transits, see Nos. 6035-6057.

THE "STANDARD" TRANSIT

This instrument is designed to take the place of our higher grade Transits for engineering work and land surveying where the highest degree of accuracy is not desired.

The instrument is substantially made, and all of its essential parts, such as accuracy of graduation, sensitive plate levels and the optical qualities of telescope, have been preserved, the same as in our higher priced instruments, and to designate these instruments, we have adopted the name "Standard."

The horizontal circle is 6¼ in. to edge of graduation, two double opposite verniers reading to minutes, graduated on brass, silvered; the graduation has two rows of figures reading in opposite directions, one from 0 to 180, and the other from 0 to 360. The vernier openings are at an angle of 30° to line of sight, and covered with plate glass.

The compass needle is 4½ inches long, and compass is provided with variation plate for the needle.

The terrestrial telescope is 11 in. long, achromatic object glass 1⅛ in. diameter, object slide has rack and pinion movement, and the eye-piece is focused by a spiral motion.

Two graduated bubbles to vernier plate; all tangent screws with opposing spring, long compound centers. The instrument is leveled by four leveling screws and is provided with shifting center.

The instrument is packed in nicely finished hardwood case, together with plumb bob, sunshade, reading glass and several adjusting pins.

No. 6135. Standard Engineers' Transit, plain; complete, with split-leg tripod, box, etc., ... Each, $150 00

6145. Standard Engineers' Transit, with level attachment; complete, with split-leg tripod, box, etc., ... Each, 160 00

6150. Standard Engineers' Transit, with level attachment and vertical arc, graduated on silver, vernier reading to minutes, clamp and tangent screws to telescope axis; complete, with split-leg tripod, box, etc., ... Each, 175 00

For our highest grade Engineers' Transits, see Nos. 6035-6057.

"STANDARD" ENGINEERS' TRANSIT

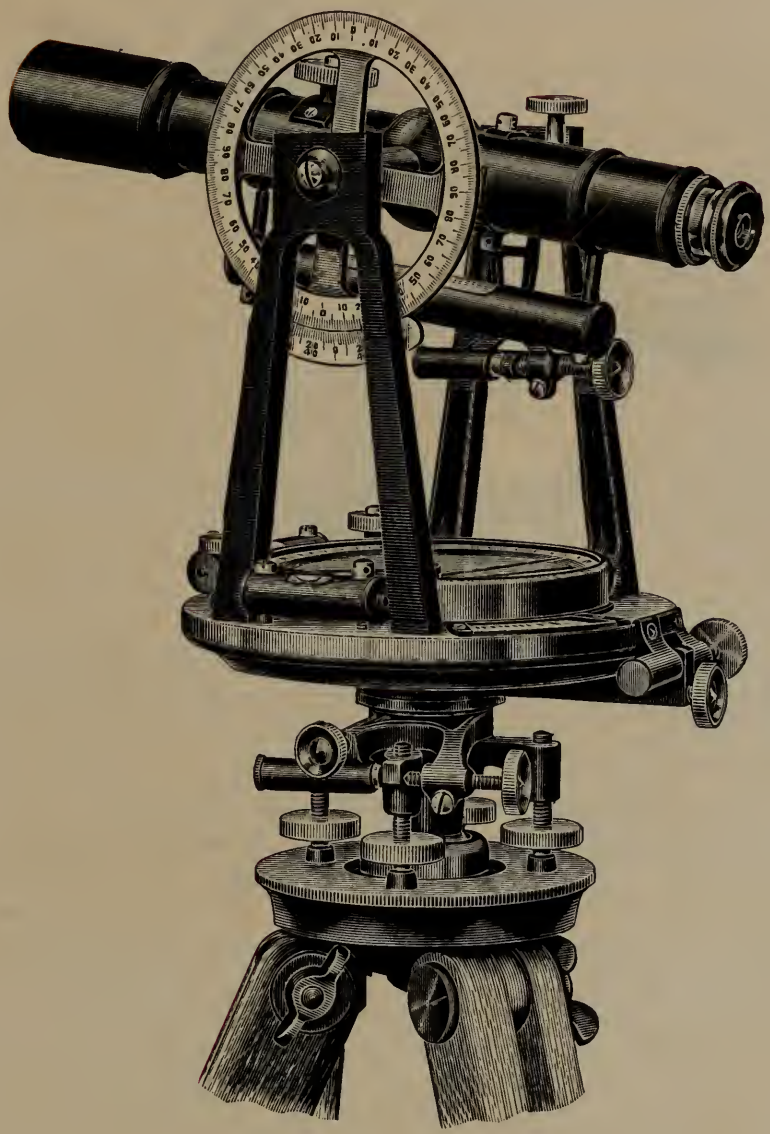
WITH LEVEL ATTACHMENT AND VERTICAL CIRCLE.

No. 6155.

No. 6155. Standard Engineers' Transit, as described under No. 6135, with level attachment and 5-in. vertical circle, graduated on silver, vernier reading to minutes, clamp and tangent screw to telescope axis; complete, with split leg tripod, box, etc., ... Each, $180 00

For our highest grade Engineers' Transits, see Nos. 6035-6057.

RECONNOISSANCE TRANSIT

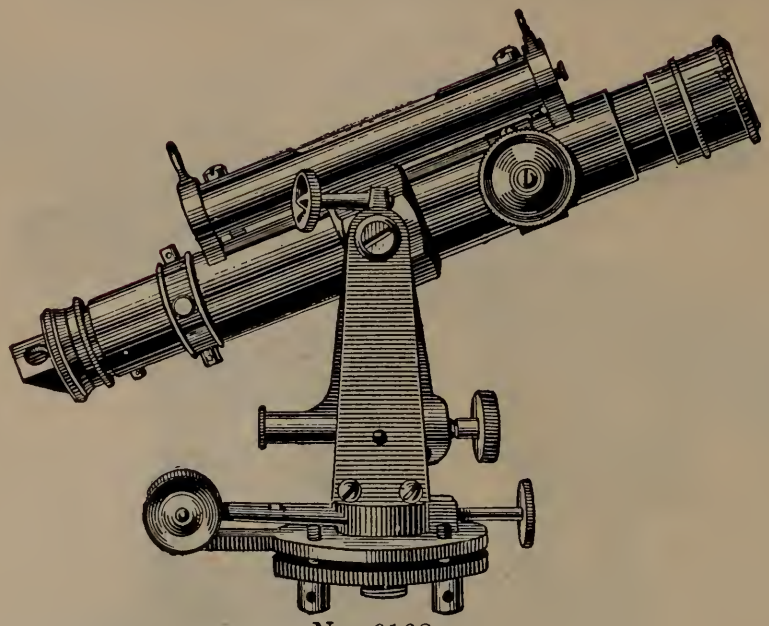


No. 6165.

No. 6165. Reconnoissance Transit, with erecting telescope 9 in., stadia wires; 4½ in. bubble to telescope, object glass 1 in. diameter; rack and pinion to object slide, spiral motion focusing arrangement to eye-piece; clamp and tangent screws to telescope axis; vertical circle, 3½ in., silvered, graduated to degrees and numbered in quadrants, double vernier reading to 2 minutes; horizontal limb, 5 in. diameter, silvered, graduated to ½ degrees, and numbered 0—180—0, one double vernier reading to single minutes; vernier opening at an angle of 30° to line of sight. Compass needle 3½ in., with variation plate, two plate levels, clamp and tangent screws to horizontal plates, 4 leveling screws, shifting center. Instrument packed in polished wooden box, with sun-shade, plumb bob, magnifying glass and adjusting pins.

No. 6165. Reconnoissance Transit, complete, with extension tripod, box, etc., ... Each, $115 00

IMPROVED SAEGMULLER SOLAR ATTACHMENT



No. 6168.

No. 6168 represents the improved solar attachment as now made. It consists essentially of a small telescope and level, the telescope being mounted in standards, in which it can be elevated or depressed. The standard revolves around an axis, called the polar axis, which is fastened to the telescope axis of the transit instrument. The telescope called the "Solar Telescope" can thus be moved in altitude and azimuth. Two pointers attached to the telescope to approximately set the instrument are so adjusted that when the shadow of the one is thrown on the other the sun will appear in the field of view.

ADJUSTMENT OF THE APPARATUS

1. The Transit must be in perfect adjustment, especially the levels on the telescope and the plates; the cross axis of the telescope should be exactly horizontal, and the index error of the vertical circle carefully determined.

2. The polar axis must be at right angles to the line of collimation and horizontal axis of main telescope.

To effect this, level the instrument carefully and bring the bubble of each telescope level to the middle of its scale. Revolve the Solar around its polar axis, and if the bubble remains central the adjustment is complete. If not, correct half the movement by the adjusting screws at the base of the polar axis, and the other half by moving the solar telescope on its horizontal axis.

3. The line of collimation of the solar telescope and the axis of its level must be parallel.

To effect this, bring both telescopes in the same vertical plane and both bubbles to the middle of their scales. Observe a mark through the transit telescope, and note whether the solar telescope points to a mark above this, equal to the distance between the horizontal axes of the two telescopes. If it does not bisect this mark, move the cross wires by means of the screws until it does. Generally the small level has no adjustments and the parallelism is effected only by moving the cross hairs.

The adjustments of the Transit and the Solar should be *frequently* examined, and kept as nearly perfect as possible.

DIRECTIONS FOR USING THE ATTACHMENT

First. Take the declination of the sun as given in the Nautical Almanac for the given day, and correct it for refraction and hourly change. Incline the *transit telescope* until this amount is indicated by its vertical arc. If the declination of the sun is north, depress it; if south, elevate it. Without disturbing the position of the transit telescope, bring the solar telescope into the vertical plane of the large telescope and to a horizontal position by means of its level. The two telescopes will then form an angle which equals the amount of the declination, and the inclination of the solar telescope to its polar axis will be equal to the polar distance of the sun.

Second. Without disturbing the *relative* positions of the two telescopes, incline them and set the vernier to the co-latitude of the place.

By moving the transit and the "Solar Attachment" around their respective *vertical* axes, the image of the sun will be brought into the field of the solar telescope, and after accurately bisecting it the *transit telescope must be in the meridian, and the compass-needle indicates its deviation at that place.*

The vertical axis of the "Solar Attachment" will then point to the pole, the apparatus being, in fact, a small equatorial.

No. 6168. Improved Saegmuller Solar Attachment, ... Each, $50 00
This price includes attaching when furnished with new Instruments.

REPAIR OF INSTRUMENTS

As our central location requires us to repair all the various makes of instruments in the country, while Eastern establishments, as a rule, only repair their own, we were obliged to procure all the material, patterns, tools, etc., necessary for these. Having the patterns for all those parts which often want to be replaced when injured by falls, such as the axis to the telescope, centers, etc., facilities for cutting any threads from 5 to 100 to an inch; object glasses and eye-piece lenses of any desired focus; level vials of every diameter and length; we are prepared to do the work as economically and promptly as the maker himself can do it. By sending their instruments to us in Chicago the Western engineers and surveyors will save several days' time and from two to three dollars expressage.

Instruments sent to us are always thoroughly overhauled and put in as good a condition as possible, unless directions are given specifying the repairs desired. We believe that the best policy, insuring satisfaction and a saving of money, is to leave it to our judgment, as there are often points appearing trivial to the engineer, but which must be corrected if the instruments are to be relied on.

A good deal of correspondence arises about the cost of repairs, and although it is impossible to state the exact figures, we will give a general idea of such here.

The most costly instrument to repair is the Transit, being the most complicated. If injured by a fall, new centers and new axis to telescope are generally required, the cost extending from $10 to $30, or sometimes even $50. If slightly injured, the cost will vary from $5 to $10.

Injuries to leveling instruments sustained by falling are generally less serious, ranging in cost from $5 to $10.

The cost of repolishing, bronzing and lacquering an instrument, varies according to condition, but may be stated generally as follows:

Surveyors and Railroad Compasses, ...	from	$ 5	00	to $10	00
Transits and Theodolites, ...	"	15	00	" 25	00
Y Levels, etc., ...	"	10	00	" 15	00

It must be understood that the above prices are in addition to cost of necessary repairs and adjustment of the instrument.

Transits and Levels should always be accompanied by the leveling plates; the legs and the head to them need not be sent. With compasses, the ball spindle should be sent along. We advise our customers to carefully pack instruments sent to us for repairs, as they might sometimes be injured by neglecting this precaution. When an instrument is sent to us, a letter or postal card should always be mailed the same day, giving us the directions and stating when the return is required.

PRICES OF PARTS OF INSTRUMENTS LIABLE TO LOSS OR INJURY

Needle, having the largest breadth in a vertical direction, which is far superior to the flat style,		Each,	$4 00
Center Point,		"	75
Center Cap, with jewel,		"	1 50
Center Cap, with steel center,		"	1 75
Cap for eye-piece or object glass,		"	1 00
Shade for object glass,		"	75
Clamp screws for horizontal limb, telescope clamp or lower tangent movement,		Each,	75
Leveling Screws,	Per set, $5 00	"	1 50
Tangent Screws for any of our Transits or Levels,		"	1 25
Object Glass, best quality, for Transits (mounted),		"	7 00
Object Glass, best quality, for Y Levels,		"	9 00
Eye Lense and Setting for any eye-piece,		"	1 50
New Cross Hairs and adjusting,		"	2 00
New Cross Hairs with Diaphragm,		"	2 75
Fixed Stadia Hairs to any instrument,		"	5 00

MISCELLANEOUS

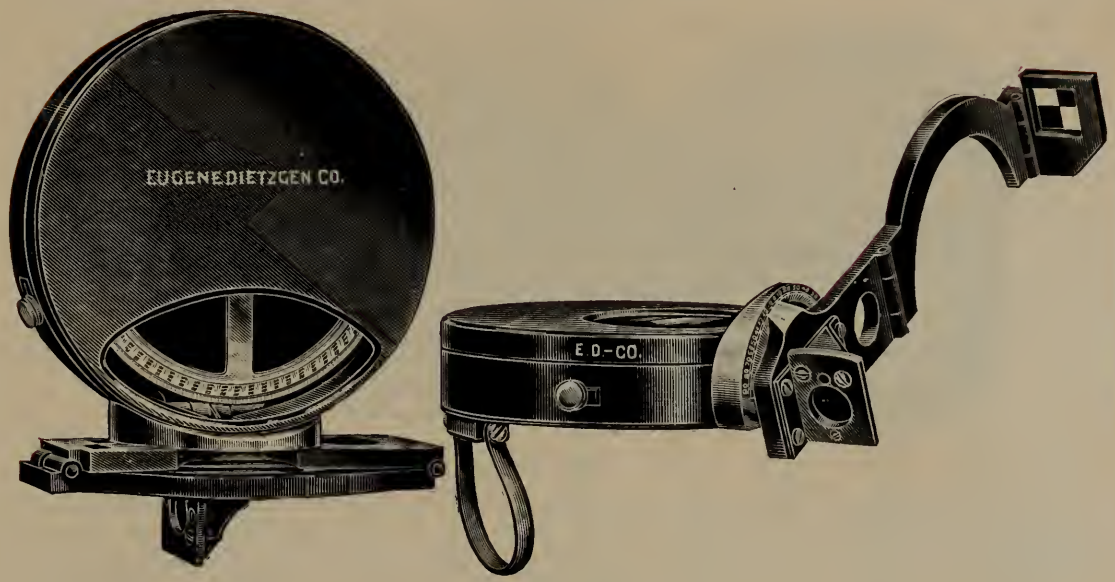
Highly finished Cherry or Mahogany Case, with Lock, Hooks, and Leather strap fitted for Transit or Level,	Each,	$ 7 50
Regraduating Limb and Verniers of Transit,	"	12 00
Regraduating Vertical Circle and Vernier,	"	6 00
New Targets, complete, for New York or Philadelphia Rods,	"	5 00
Vernier Clamp, with screw and spring for Philadelphia Rods,	"	2 50
Clamp and Screw for New York Rods,	"	2 00
Bolts for tripod head, complete,	"	75
New Tripod Head, without bolts,	"	5 00
Wooden Cap for Tripod,	"	75
Chamois Skin, large size, best quality,	"	65
Gossamer Cover, for Transit or Level,	"	1 00
Bottle of Watch Oil for lubricating centers,	"	25
Adjusting Pins of tempered steel,	"	10

For Spirit Levels, see Nos. 6180-1-7.

For Tripods and Parts, see Nos. 6200-6215.

THE VERSCHOYLE POCKET TRANSIT

Patented.



No. 6169.

This Instrument combines the useful features of the Abney Level, Prismatic Compass and Clinometer, and was designed by a mining engineer of practical experience in the use and possible application of the various forms of instruments intended for preliminary survey.

Owing to its novel construction, only one observation is necessary to obtain both the magnetic bearing and the vertical angle of any distant point. It is also specially adapted for use in difficult positions, such as are always liable to occur in filling in the rougher details in a mining survey.

To use the instrument for obtaining horizontal and vertical angles, after freeing the needle and unfolding the arm, grasp the compass box in the left hand, and then with the extended fingers of the right hand lightly grasp the arm and bring the distant target or light to the intersection of the cross lines at the end of the arm. When h lding the arm firmly in that position, with the left hand slightly revolve the compass box until the small level bubble is seen through the prism to be at the central mark. The magnetic bearing will now be plainly visible in the prism at the same time that the target is viewed along the sight line, and the angle of depression or elevation is automatically recorded on the vertical arc. Both readings can then be booked at the same time without further observation.

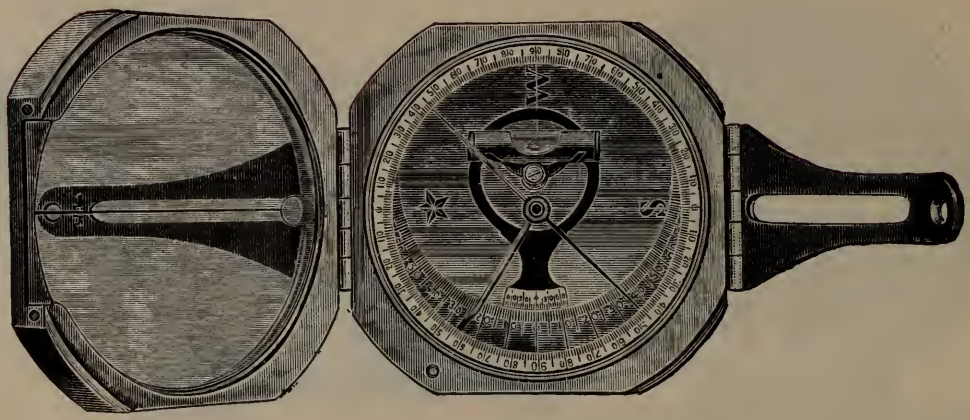
To use the instrument as a clinometer, lay the bottom side of the arm on the object to be observed, and looking through the window at the top of the compass box slightly revolve the box until the small bubble comes to the center. The angle may then be read off the vertical arc.

Should it be necessary to alter the relative position of the divided ring and the magnetic needle, this can be accomplished by removing the cover and altering the position of the needle immediately under the divided ring. Adjustment for magnetic variation may be obtained in this manner, without liability to disturb other adjustment.

Designed as a thoroughly serviceable instrument, it is constructed to withstand rough usage and is not liable to derangement or deterioration. There are no reflectors or mirrors used other than the prism, which is protected and fastened in a secure manner.

No. 6169. Verschoyle Pocket Transit, bronzed brass, 3⅜ in. diam., needle about 2½ in., aluminum ring graduated to half degrees, arc giving vertical angles graduated to degrees. Weight of instrument about 15 ounces, in leather sling case, Each, $40 00

THE BRUNTON PATENT POCKET TRANSIT



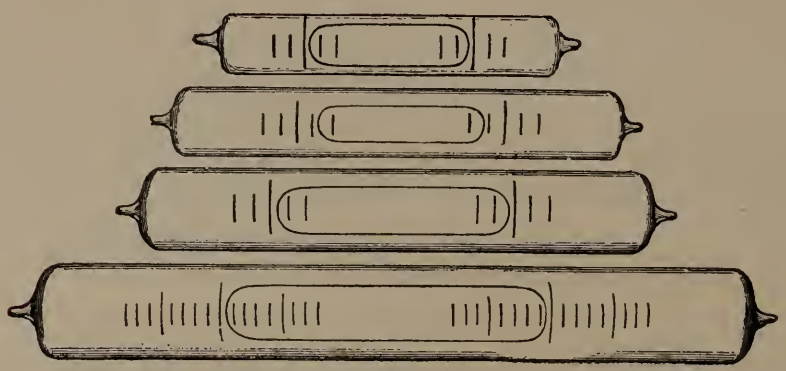
No. 6170.

A complete, accurate and reliable pocket instrument for the taking of topography and preliminary surveys of every description, either on the surface or underground; thus taking the place of a sighting compass, clinometer, prismatic compass and Abney level, and combining them as it does in one light and handy instrument.

The case is made of aluminum, $2\frac{3}{4} \times 2\frac{3}{4} \times 1$ inch. Weight of instrument about 8 ounces.

No. 6170. Brunton Patent Pocket Transit, with directions, . . . Each, $25 00

SPIRIT LEVELS

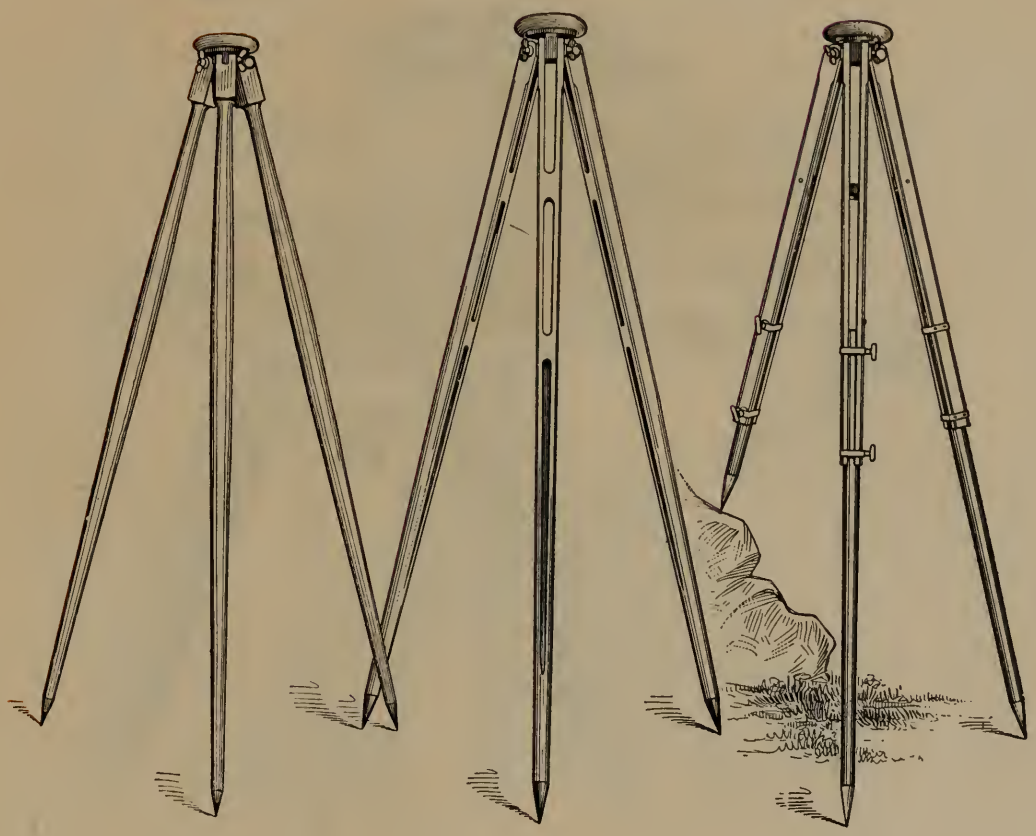


	Length from tip to tip, in inches.	Diameter, in inches.		Mounted in tube, if same is furnished, Each.
No. 6180–1.	6.50 to 6.60	0.75 to 0.80,	for Y Level Telescopes, . . .	$4 00
6180–2.	4.75	0.65 to 0.68,	for Engineers' Transit Telescopes,	3 00
6180–3.	4.10	0.58 to 0.60,	for Mountain Transit Telescopes,	2 50
6180–4.	3.00 to 3.50	0.54 to 0.56,	for Light Mt. Transit Telescopes,	2 00
6180–5.	2.00 to 2.25	0.50 to 0.53,	for Engineers' Transit Plates, .	1 00
6180–6.	1.75 to 1.85	0.44 to 0.47,	for Mountain Transit Plates, .	1 00
6180–7.	1.50	0.37 to 0.40,	for Light Mountain Transit Plates,	1 00

Levels different in size from this list can be made to order only, and will be furnished only when order is accompanied with *the tube or mounting for which one is intended, and also stating the kind of instrument it is for, and the degree of sensitiveness required.* We will positively not make any levels upon written dimensions only, but require the tube to be sent in all cases, as otherwise we will not be responsible for any failure in that respect.

TRIPODS

For Levels and Transits.



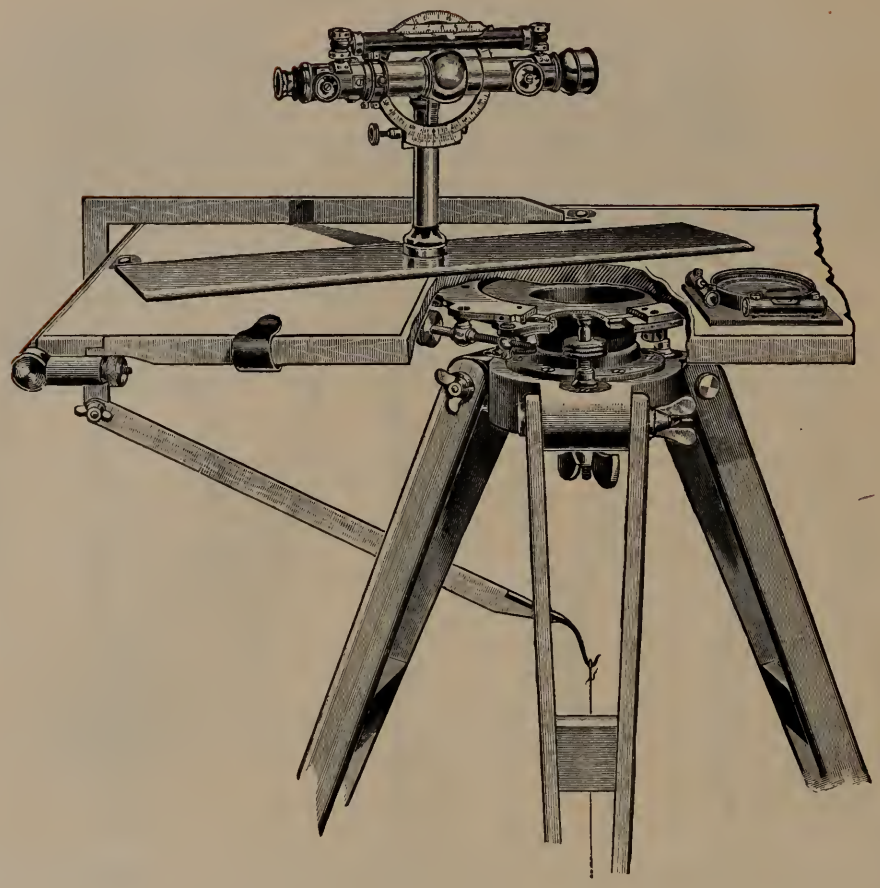
No. 6200. 6204. 6206.

No. 6200.	Solid Leg Tripod, hardwood, for Levels and Transits, Each,	$10 00
6202.	" " " " light, for Architects' Levels, "	6 00
6204.	Split " " " for Levels and Transits, "	12 00
6206.	Extension " " " " " " "	15 00
6207.	" " " " Mountain Transits, "	15 00
6208.	" " " " Light Mountain Transits "	15 00
6210.	Solid Tripod Legs, heavy, . Per set of 3, $ 5 00; "	1 75
6211.	" " " light, . . " 3, 4 25; "	1 50
6212.	Split " " heavy, . " 3, 7 00; "	2 50
6214.	Extension Tripod Legs with clamps, heavy, Per set of 3, 10 00; "	3 65
6215.	Extension Tripod Legs with clamps, light, Per set of 3, 9 50; "	3 50

The Solid and Split Leg Tripods have a little spur at the points.

For Jacob Staffs and Tripods for Compasses, see Nos. 5958-5959.

PLANE TABLE



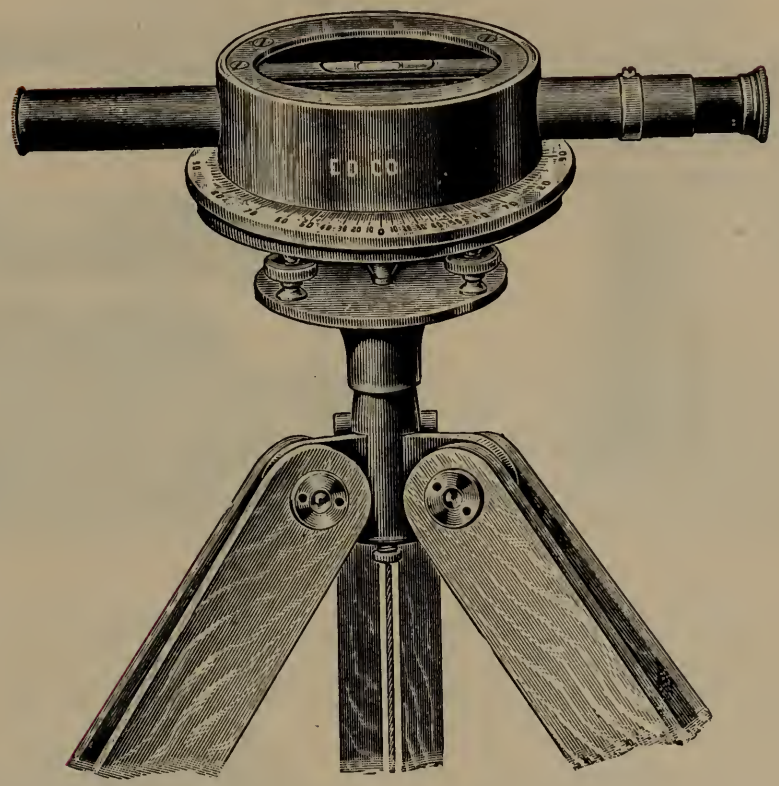
No. 6230.

No 6230. Plane Table, board 24 × 30 inches, mounted on large tripod, with leveling-socket and clamp, and with plumbing-arm, plummet and clamps for paper; set of three leveling screws, clamp and tangent for movement in azimuth, combined compass and levels with square base. Alidade, with telescope 11 in. long, magnifying power of 24 diameters, with stadia; vertical circle, 4½ in., with vernier reading to one minute; level on telescope and clamp and tangent screw.

No. 6230. Plane Table, complete, ... Each, $170 00

BOSTROM'S BUILDERS' LEVEL

For Builders, Carpenters and Stone Masons.



No. 6306.

An absolutely reliable leveling instrument for Builders, Carpenters and Stone Masons. Can be used for any kind of foundation work and getting angles, is simple in construction, easily understood, and can be operated by any one. Is made of brass, oxidized, with a silvered circle graduated to degrees, an achromatic telescope of ample power for such work, and a sensitive ground level vial.

No. 6306. Bostrom's Builders' Level, with plumb bob, tripod and graduated rod with target, ... Each, $25 00

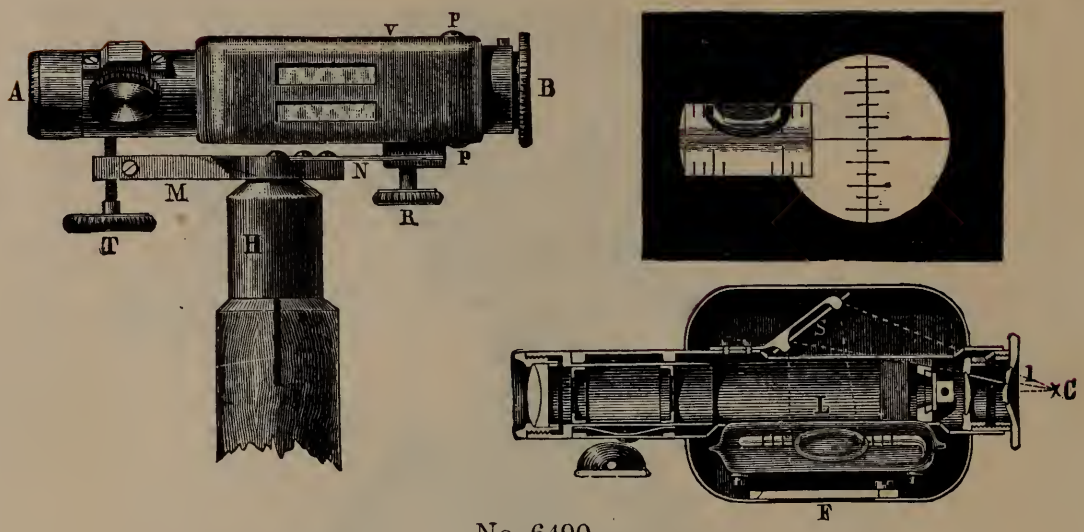
BOSTROM'S FARM LEVEL

This instrument is particularly adapted for farm use, for terracing, ditching, irrigation and drainage work. It possesses the latest patented improvements in simplicity and usefulness and can be operated by any one. Is made of iron and black enamel. The sliding telescope tube and spirit level are of polished and lacquered brass. The circle is graduated to degrees.

No. 6308. Bostrom's Farm Level, with plumb bob, tripod and graduated rod with target, ... Each, $12 50

POCKET LEVELING INSTRUMENT

WITH REVERSION LEVEL.



No. 6490.

For the use of engineers in reconnoissance work and filling in topographical details; capable of close results. The instrument is fitted with a reversion level and has, as compared with other designs, a striding level, the important advantage being that it dispenses with the inconvenience of adjusting the level, also with the reversing of the telescope in its wyes.

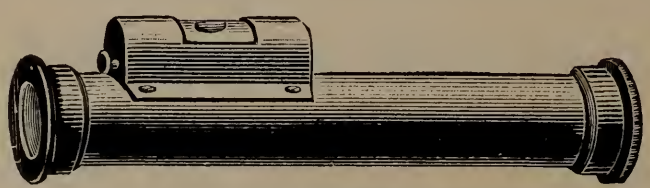
The telescope magnifies 12 times; its definition is such that less than one-half an inch can be read off at a distance of 300 feet. The degree of accuracy is 1-20000 of the distance.

The reversion level is encased and protected from external influences· the bubble is directly visible in the field of the eye-piece, the whole is mounted on a light tripod with a ball and socket joint.

This instrument, which is intended for accurate measurements, can be used without preliminary adjustment. The manipulation is very simple, and is done thus. set up the instrument with the level on the left and take a reading; unscrew the milled-headed screw by which it is fastened to the horizontal bar carrying the micrometer screw; turn the instrument upside down with the level on right and fasten in place; take another reading and the arithmetical mean is the correct value.

No. 6490. Pocket Leveling Instrument, complete, in case, . . . Each, $42 00

LOCKE'S HAND LEVELS



No. 6500.

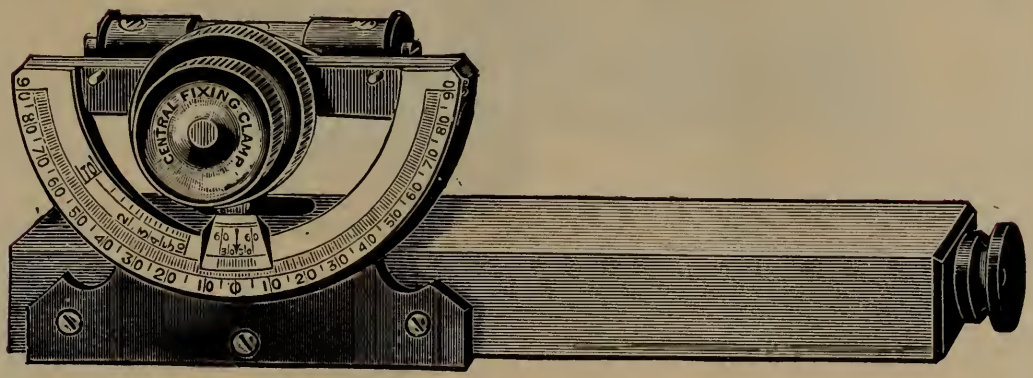
No. 6500.	Locke's Hand Level, German Silver, in case, 5 in.,	Each,	$7 50
6500B.	" " " Bronzed, in case, 5 in., . .	"	7 00
6501.	" " " Brass, nickel plated, in case, 5 in.,	"	6 00
6501B.	" " " " plain, in case, 5 in., .	"	5 00

HAND LEVELS

Continued

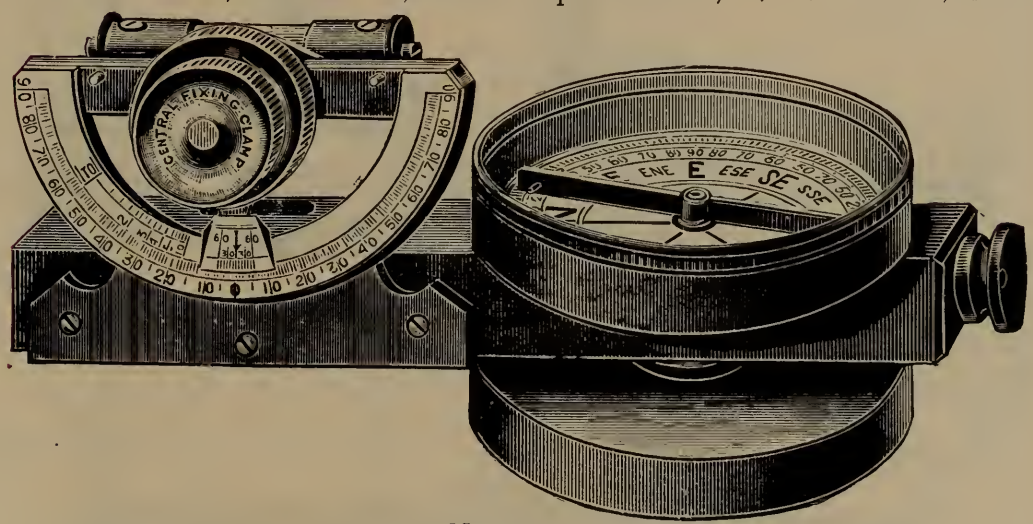
No. 6502.

No. 6502. Hand Level, square tube, bronzed, 5 inch, ... Each, $4 50



No. 6510.

No. 6510. Abney's Reflecting Level or Pocket Altimeter, square bronzed sighting tube 5 in., vertical arc 1 in., graduated 90° in each direction to single degrees, folded vernier reading to 5 minutes, scale of grades from 1:1 to 1:10, 1 in. bubble, in leather pocket case, . . Each, $13 50

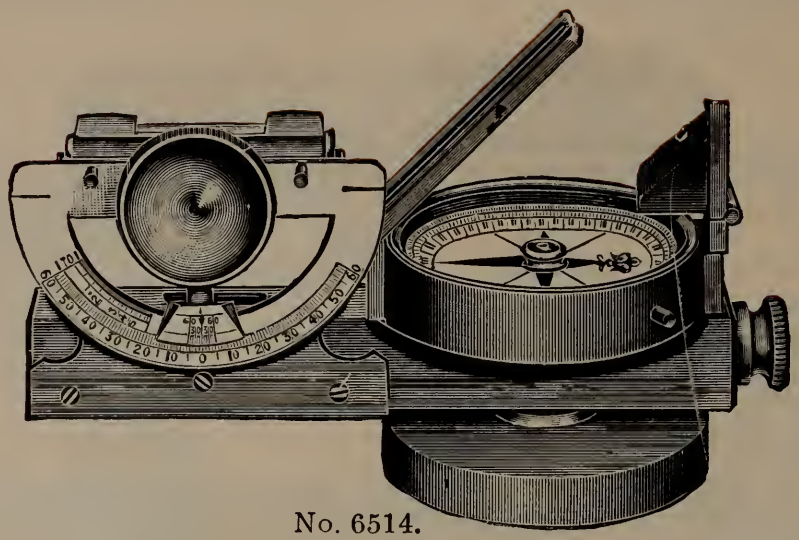


No. 6511.

No. 6511. Abney's Reflecting Level or Pocket Altimeter, 5 in., with divided arc to show angles, and with bar needle compass and socket for Jacob staff, in case, ... Each, $18 00

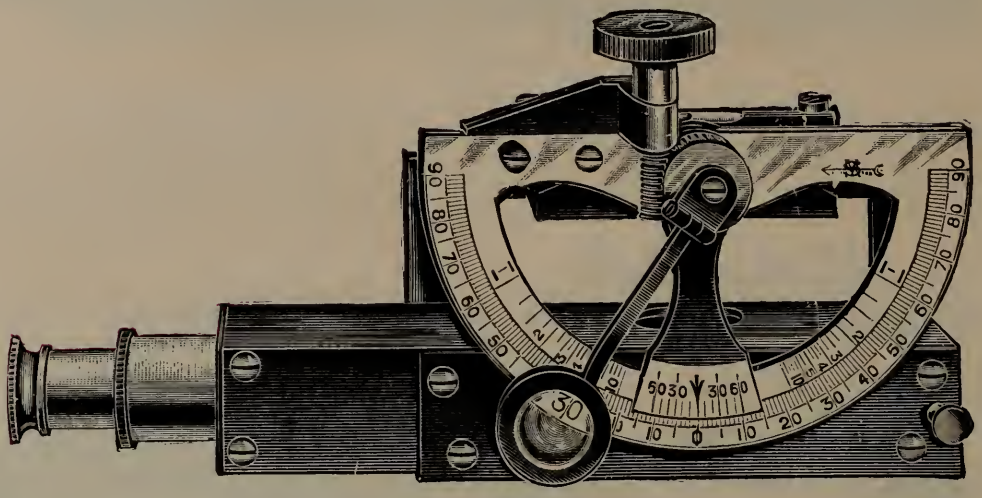
These instruments are used for getting the height of buildings, trees, hills, etc., and also for fixing the slopes or gradients of rails for railways, the rise and fall for drainage purposes, and all operations where angular distance or inclination of surface is wanted.

HAND LEVELS *Continued*



No. 6514.

No. 6514. Improved Abney Level, 5 in. long, combined with prismatic card dial compass, in leather sling case, ... Each, $28 50



No. 6516.

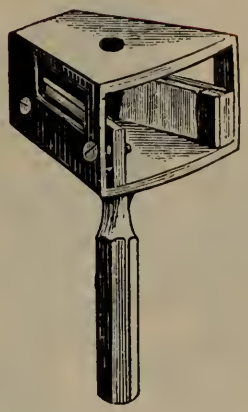
No. 6516. Improved Abney Level with rack movement. This instrument has an extra large arc divided 0° to 90° each way, with vernier reading to 10 minutes, magnifying lens and a double draw telescope, double reading grade scale. By the rack and pinion movement it can be precisely and easily adjusted. In leather sling case, ... Each, $32 50

No. 6518.

No. 6518. Stadia Hand Level, telescope 10 in., with object glass 1 in., adjustable eye-piece, stadia hairs reading 1:100, with ball joint and socket. This instrument will be found very useful for preliminary surveys, etc.; weight about 1½ lbs., in leather sling case, ... Each. $18 00

ANGLE MIRRORS

No. 6521.



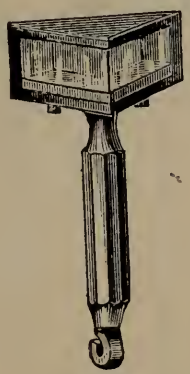
6522.

No. 6521. Angle Mirror, for right angles, with small plumb bob.
Size of instrument when packed, $3\frac{3}{4}\times2\times1\frac{3}{4}$ in., in case, Each, $7 50

6522. Angle Mirror, for right angles, plain, in case, ... " 5 00

ANGLE PRISMS

No. 6523.



6524.

6525.

6526.

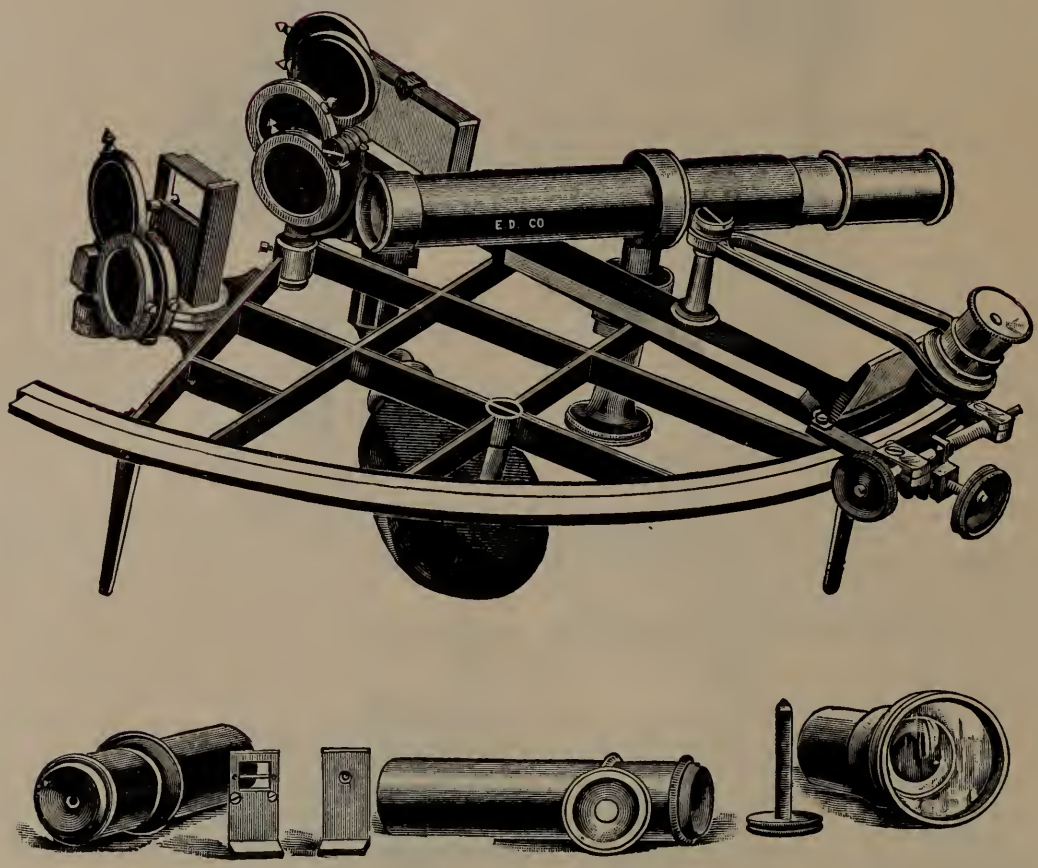
No. 6523. Rectangular Prism, for angles of 90 degrees, $2\times1\frac{1}{4}\times\frac{7}{8}$ in., in morocco case, ... Each, $ 4 50

6524. Rectangular Prism, for angles of 90 degrees, $2\frac{1}{2}\times1\frac{1}{4}\times1\frac{5}{8}$ in., in morocco case, ... Each, 5 00

6525. Double Prism, for angles of 90 and 45 degrees, in morocco case, ... Each, 10 00

6526. Angle Prism, $1\frac{5}{8}\times1\frac{1}{2}\times1\frac{1}{4}$ in., with cover folding back to serve as handle, in morocco case, ... Each, 6 00

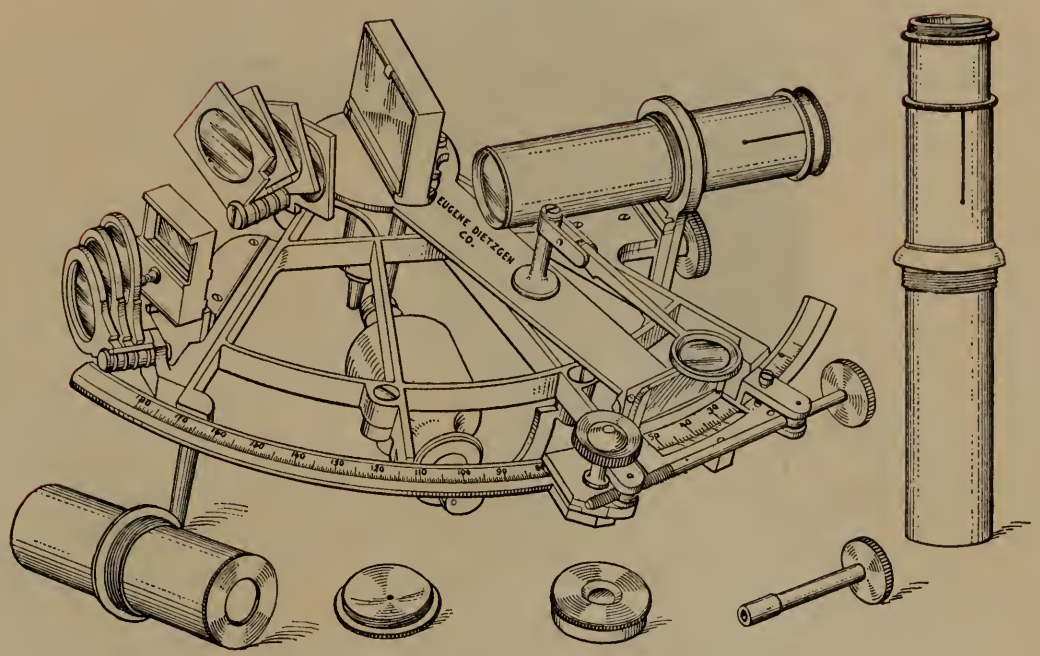
SEXTANTS



No. 6536.

No. 6536. Sextant, radius 7 inches, 145 degrees; four sun-glasses between the large and small reflecting mirror, and three sun-glasses behind the small reflecting mirror, all of which can be turned on their axes 180 degrees; graduation on solid silver, reading to 10 seconds; telescope $\frac{3}{4}$ in. aperture; two astronomical eye-pieces with powers of 6 and 10 dia. One Galilean telescope with extra large objective, power 3 dia.; one fixed reading glass; two sights for examination and correction of the large reflecting mirror. All complete in a box, ... Each, $120 00

SEXTANTS AND OCTANTS

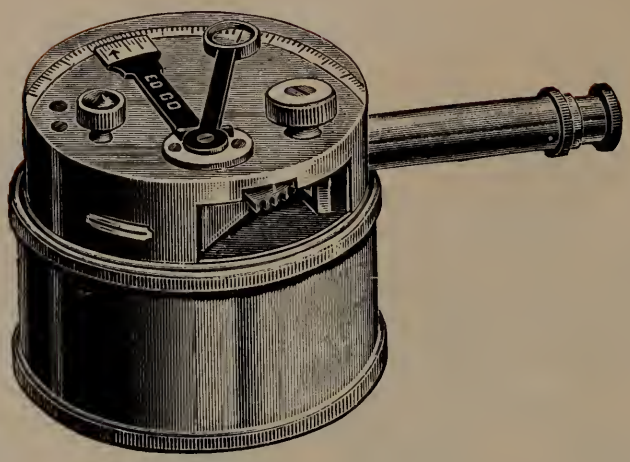


No. 6543.

No. 6543. Surveying Sextant, of gun metal, as made by us for the U. S. Navy, measuring angles up to 130 degrees. Radius 5¾ in. Graduations on inlaid silver to 20 minutes, vernier reading to 30 seconds. 1 sighting tube, 1 star telescope, one inverting telescope, magnifying power of 6 diameters. 7 neutral glasses to sextant, 2 neutral glasses for telescope and one each spare index and horizon mirror.
Instrument complete with two screw drivers, in polished mahogany case with lock and key, ... Each, $90 00

6545. Octant of gun metal, as made by us for U. S. Navy, measuring angles up to 100 degrees. Graduations on inlaid silver to 20 minutes, vernier reading to 30 seconds, magnifying glass, clamp and tangent screw to vernier, 1 sighting tube, 1 star telescope, 7 neutral glasses to octant, 2 neutral glasses for telescope, 1 each spare index and horizon mirror.
Instrument complete with two screw drivers, in polished mahogany case with lock and key, ... Each, 80 00

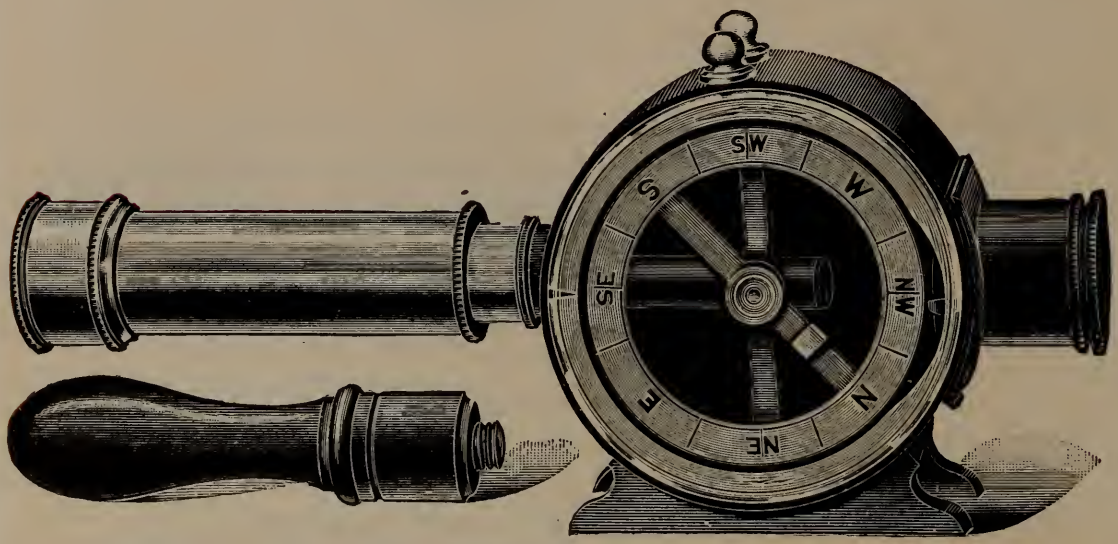
POCKET SEXTANT



No. 6547.

No. 6547. Pocket Sextant, divided on silver to 30 minutes, vernier reading to 1 minute, with telescope, 2 neutral glasses, reading lens, and micrometer tangent screw. Metal box 3 inches in diameter by 1½ inches high, in leather sling case, Each, $40 00

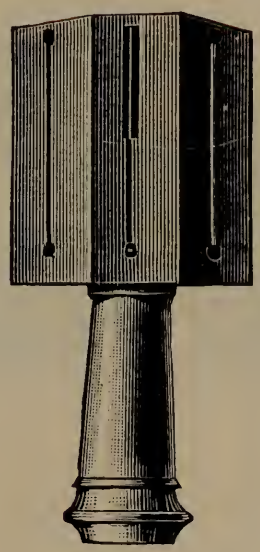
POCKET ALT-AZIMUTH



No. 6548.

No. 6548. Pocket Alt-Azimuth, for Travelers and Military Surveyors; altitudes, azimuths, compass bearings, Clinometer degrees and levels, all are obtainable by this handy and accurate little instrument. The advantages of its use have been so increased by the recent addition of an excellent telescope as to make it perfect for the various purposes to which it can be applied. Size of instrument 6½ inches long, 2½ inches in diameter, 1⅛ inches thick, weight 13 ounces, in morocco case, ... Each, $47 00

CROSS STAFF HEADS

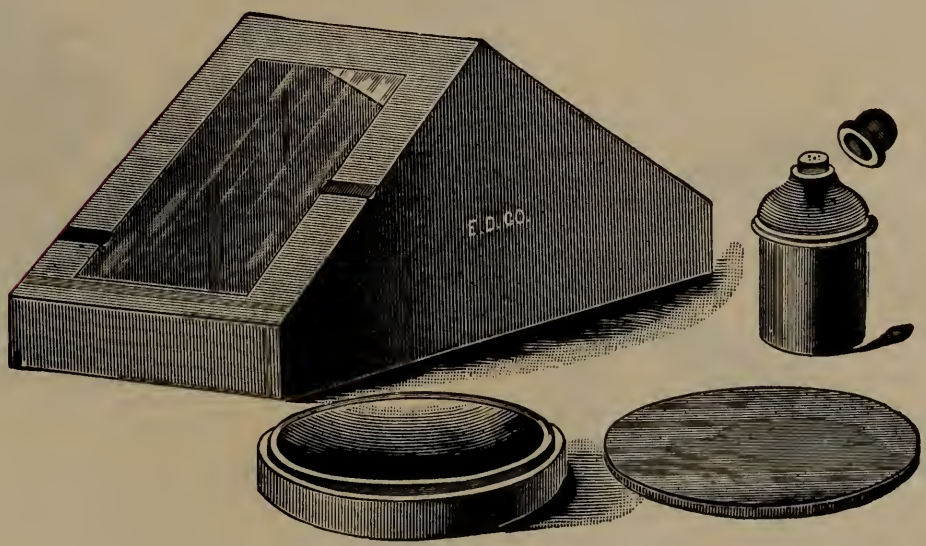


No. 6550.

No. 6550.	Cross Staff Head, octagonal, for Jacob staff, $2\frac{1}{2}$ in., in case, Each,	$ 2 70
6552.	Cross Staff Head, octagonal, for Jacob staff, with magnetic compass, 3 in. needle, $1\frac{3}{4}$ in., ... Each,	4 50
6554.	Cross Staff Head, like No. 6552, with vertical axis and divided circle, to take angles, $3\frac{3}{8}$ in., needle, $2\frac{1}{8}$ in., . . . , Each,	11 50

For Jacob Staff and Tripod, see Nos. 5958 and 5959.

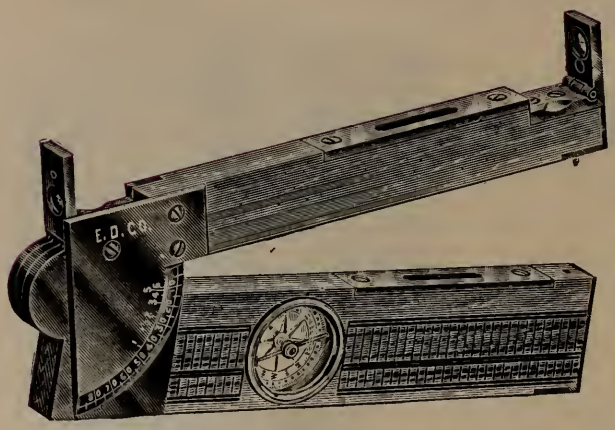
ARTIFICIAL HORIZON



No. 6556.

No. 6556.	Mercurial Horizon, of boxwood, with silver plated copper bowl; bottle of boxwood for mercury; brass rectangular roof, with glass covers made of parallel glass. All complete, packed in a box, ... Each,	$45 00

CLINOMETERS

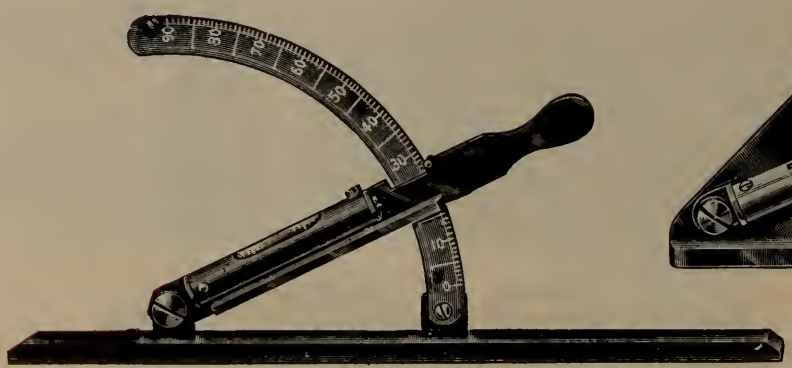


No. 6561.

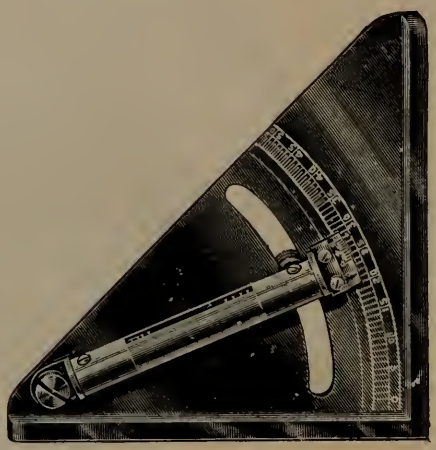
No. 6560. Boxwood Clinometer, 12 in. folding to 6 in., brass mountings, with one spirit level, compass and inclination scale, in leather case, ... Each, $ 8 50

6561. Boxwood Clinometer, like No. 6560, but with two spirit levels and with folding sights, in leather case, . . Each, 11 50

The Inclination Scale marked on these Clinometers gives the value of any angle, as follows: The angle having been ascertained from the divided arc upon the instrument, refers to that degree in the column marked "Angle," and opposite in another column will be found the rise or fall in any given measured distance; for instance, say the degree shown on the divided arc is 18, opposite to this number on the scale is 3, thus indicating one part rise or fall in three, or 1 inch in 3 inches, or 1 foot in 3 feet.



No. 6566.

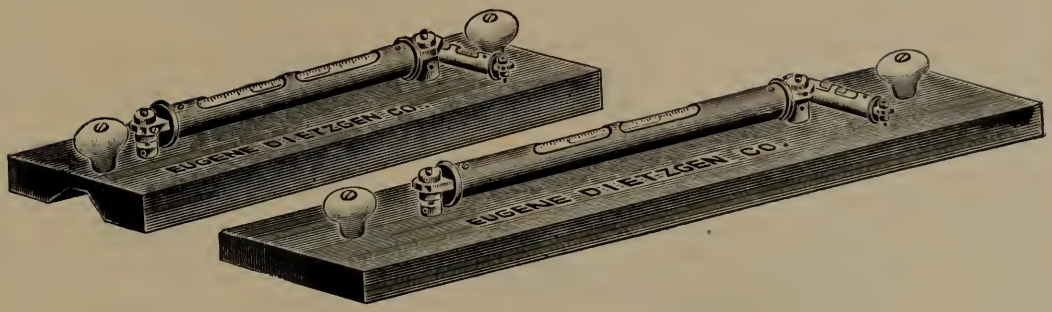


6564.

No. 6564. Clinometer or Slope Level, of brass, triangular frame 4½ in. side, divided to ½ degrees, vernier reading to 3 minutes, in substantial case, ... Each, $10 00

6566. Clinometer or Slope Level, of brass, 8⅜ in. long, with folding arc and vernier reading to 3 min., in substantial case, Each, 12 00

ADJUSTABLE LEVELS



No. 6571. 6572. Each.

No. 6570. Adjustable Level, flat iron base 12×3×1 in., very sensitive spirit level 6 in., weight about 6 lbs., in hardwood case, $12 00

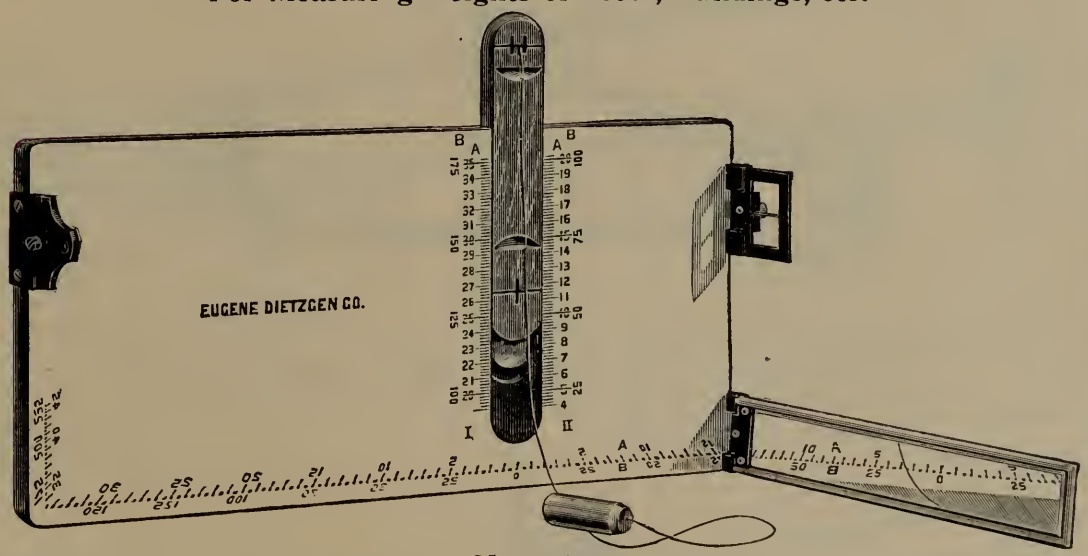
6571. Adjustable Level, grooved iron base 12×3×1 in., very sensitive spirit level 6 in., weight about 6 lbs., in hardwood case, 16 00

6572. Adjustable Level, flat iron base 18×4×1 in., very sensitive spirit level 9 in., weight about 13 lbs,, in hardwood case, 20 00

These levels are of the finest workmanship and very sensitive. The spirit levels are adjustable and are graduated on the glass. A cross level is provided to obtain accurate adjustment. Level No. 6571 with grooved iron base is for use on cylindrical surfaces.

HYPSOMETERS

For Measuring Heights of Trees, Buildings, etc.



No. 6575.

No. 6575. Mirror-reading Hypsometer (after Faustmann), 7×3¼ in., improved construction, of polished hardwood, graduations on white composition protected by coating against atmospheric influences, with folding sights and hinged mirror, with scale of heights on base of instrument and scales of distances on either side of groove in which the slide moves. The slide to which the plumb bob cord is fastened is provided with two reading lines to correspond with the two scales of distances; in pocket with flap and directions, . Each, $ 6 00

6578. Mirror-reading Hypsometer (after Faustmann), like No. 6575, but made of brass, with graduations on silvered surface, with folding sights and hinged mirror; in pocket with flap and directions, ... Each, 18 50

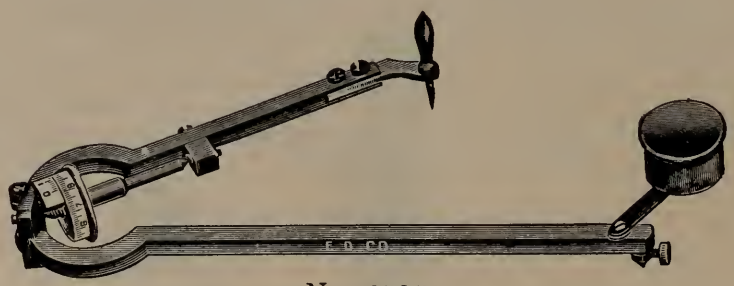
PLANIMETERS

These ingeniously devised instruments rank high among the various modern mechanical aids to the calculations and computations necessary in the work of Mechanical, Civil and Naval Engineers.

The Planimeter affords the most simple and convenient method of measuring the area of plain surfaces on drawings and plans. The accuracy of the results which can be obtained, when the instrument is carefully made and properly used, is so great that the Planimeter is now an indispensable aid to a constantly increasing number of the most progressive members of the engineering profession. In cases of irregular surfaces, the results obtained by the planimeter can not be equalled in accuracy by any compass and scale method of mensuration; and the time saved by using the instrument in such cases is very considerable. We carry in stock two types of planimeters, the Polar Planimeter and the Rolling Planimeter.

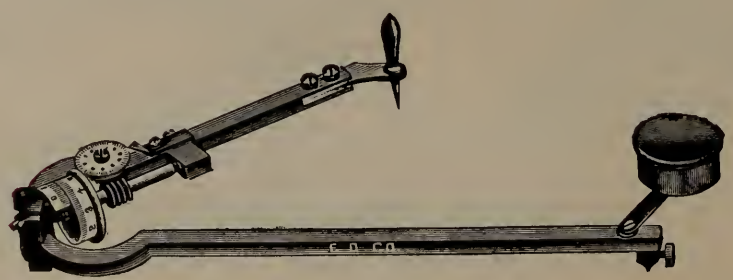
The Rolling Planimeter differs from the Polar Planimeter, in that it moves on two broad rollers, and not being limited in scope like the Polar Planimeter, a surface of any size can be measured in one operation.

Contrary to the prevalent idea, Planimeters are not difficult to use but are very simple in operation; full directions accompany each one.



No. 6595.

No. 6595. Polar Planimeter, Brass, simplest form. It covers a range up to 10 square inches and by means of vernier can be read to $\frac{1}{100}$ of a square inch, with fixed tracer arm, counterweight for needle pole, in case, ... Each, $13 50



No. 6598.

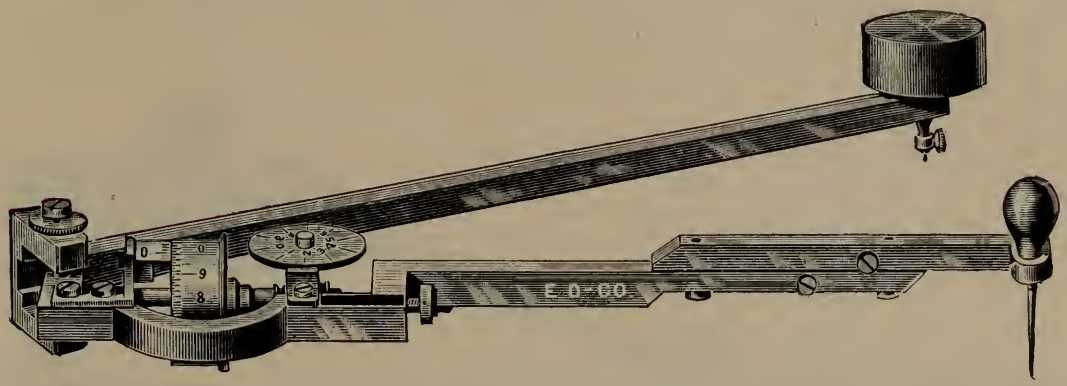
No. 6598. Polar Planimeter, Brass, with fixed tracer arm, counterweight for needle pole, and with horizontal disc registering the revolutions of the measuring roller; for measuring areas up to 100 square inches, ... Each, $15 50

PLANIMETERS *Continued*

No. 6601.

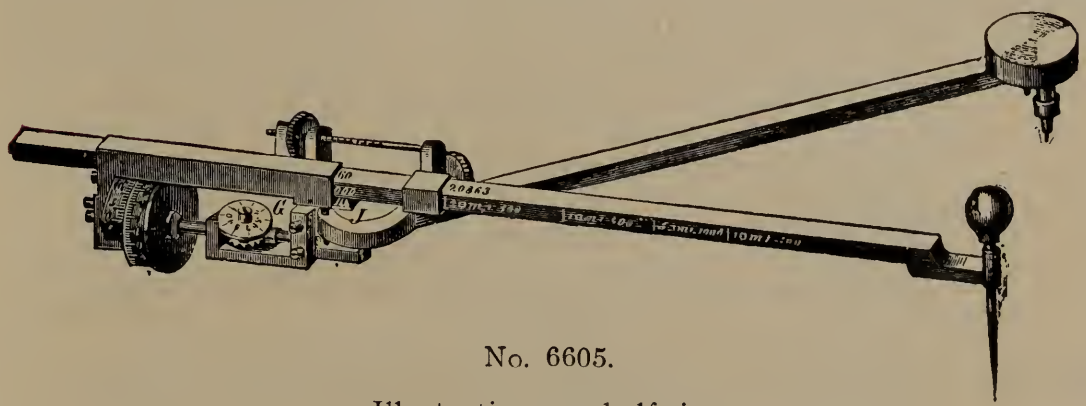
Illustration one-half size.

No. 6601. Polar Planimeter, German Silver, arranged for measurement of areas in square inches—viz., 10, 1, $\frac{1}{10}$, and $\frac{1}{100}$ square inches, with directions, in case, ... Each, $19 00



No. 6604.

No. 6604. Polar Planimeter, German Silver, for measurements the same as No. 6601, with needle pole; tracer arm so arranged that it can be shortened or made longer, and set in parallel position to axis of roller, with testing rule, in case, Each, $21 00

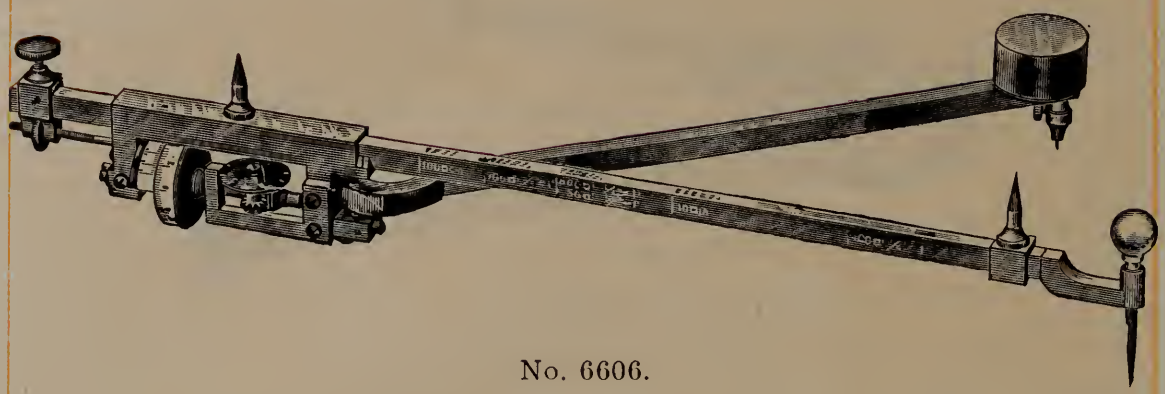


No. 6605.

Illustration one-half-size.

No. 6605. Polar Planimeter, German Silver, for every kind of measurement, with directions, in case, ... Each, $24 50

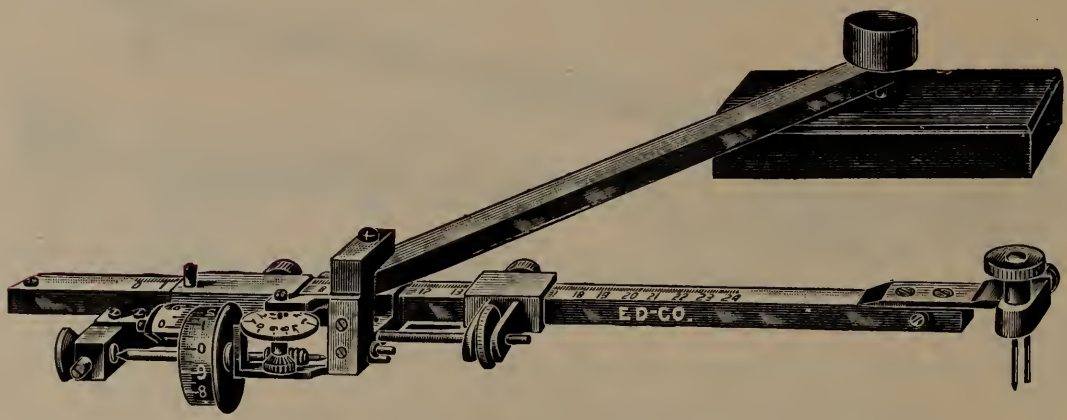
PLANIMETERS *Continued*



No. 6606.

Illustration one-half size.

No. 6606. Polar Planimeter, German Silver, for every kind of measurement, with special device for finding the mean height of indicator diagrams, with directions, in case, . . . Each, $33 00

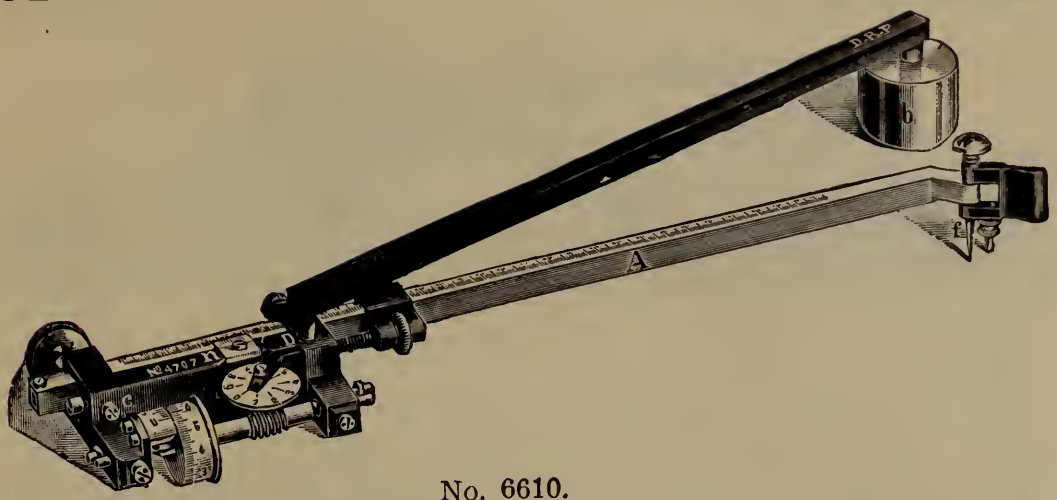


No. 6608.

No. 6608. Polar Planimeter of German Silver; the tracer arm is divided in ½ millimeters and with proportion marks for any reduction scales to be indicated at will. The sleeve on the tracer arm is adjustable over the entire length of the tracer arm and has a vernier reading to $\frac{1}{20}$ millimeter. The conveniently accessible correction screws have the purpose of setting the axis of the roller with the tracer arm parallel to the connection line of the tracing point with the pivot of the polar arm. With pole and needle testing rule fitted into morocco case, with lock, in such manner that the instrument may be laid in, set to any proportion, with directions, . . . Each, $33 00

No. 6609. Polar Planimeter of German Silver, like No. 6608, but with special device for finding the mean height of indicator diagrams; the points are protected by screw caps, with directions, in case, ... Each, **35 50**

PLANIMETERS *Continued*



No. 6610.

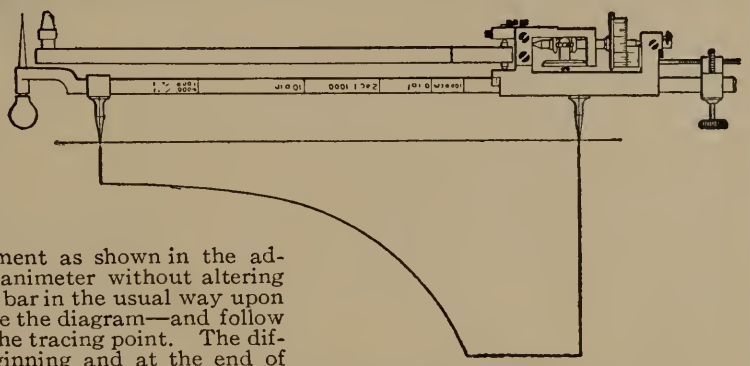
No. 6610. Compensating Planimeter, German Silver and Brass; adjustable tracer arm fully graduated, improved pole-weight; testing rule and table of settings for U. S. Standard measure, with directions, in case, ... Each, $36 00

6612. Compensating Planimeter, like No. 6610, but with adjustable pole-arm, with directions, in case, ... Each, 47 00

Planimeters No. 6610–6612 are constructed in a novel manner. Instrument No. 6610 consists of two separate parts: the tracer arm and the carriage with measuring and recording wheels, and the pole-arm having the pole-weight at one end and a steel ball at the other end, which forms a ball joint with the wheel carriage. This construction gives the tracer-arm a motion of 180 degrees right and left, whereas with the usual Planimeters a motion of only about 90 degrees can be obtained. By measuring a diagram with the pole on the left and then again with the pole on the right side of the tracer-arm and taking the mean reading, all instrumental errors are compensated.

Instrument No. 6612 has an adjustable pole-arm bearing index marks for the different settings furnished with the instrument, and can be adjusted so that when the instrument is used with the pole inside of a figure, the constant is a round number 20,000, for any setting. It is used in the same way with the pole inside as with the pole outside, and by tracing the figure with the pole on the right and on the left of tracer-arm and taking the mean reading, large areas can be accurately measured.

DEVICE FOR FINDING THE MEAN HEIGHT OF INDICATOR DIAGRAMS



This device consists of two fine steel points, one attached to the upper side of the tracer-arm and the other to the surface of the carriage in which this arm slides. To find the mean height of indicator diagram take, by shifting the slide on the bar and keeping the planimeter upside down, the diagram lengthwise between the steel points on the upper side of the instrument as shown in the adjoining figure. Then place the planimeter without altering the relative position of slide and bar in the usual way upon the drawing—needle point outside the diagram—and follow the outline of the diagram with the tracing point. The difference of the readings at the beginning and at the end of the operation divided by 0.4 is then the mean height of the diagram, expressed in inches.

Example:

Second reading	2.361
First reading	— 1.913
	0.448

0.4) 0.448 = 1.12 ins. = mean height.

If the diagrams for up and down stroke are measured jointly, divide by 0.8 instead of 0.4.

Mean pressure = Mean height × Scale of spring of indicator. Supposing the scale of the spring in the above example is 1" = 80 lbs. per sq. in., then

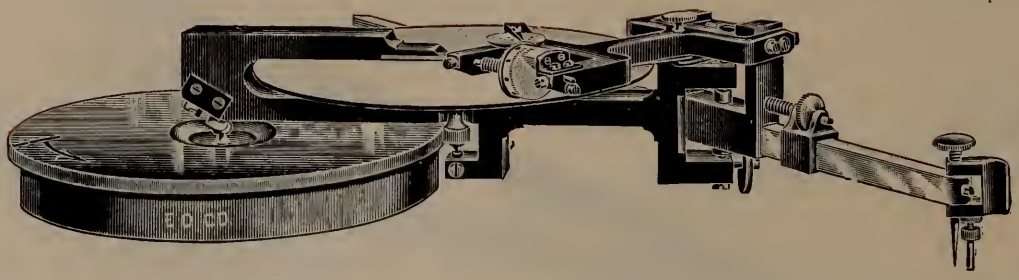
$$\text{Mean pressure} = \frac{0.448 \times 80}{0.4} = 89.6 \text{ lbs. per sq. in.}$$

The number of lbs. per inch of height being usually a multiple of 4, the arithmetical work is thus extremely simple.

For Instruments having this Device, see Nos. 6606 and 6609.

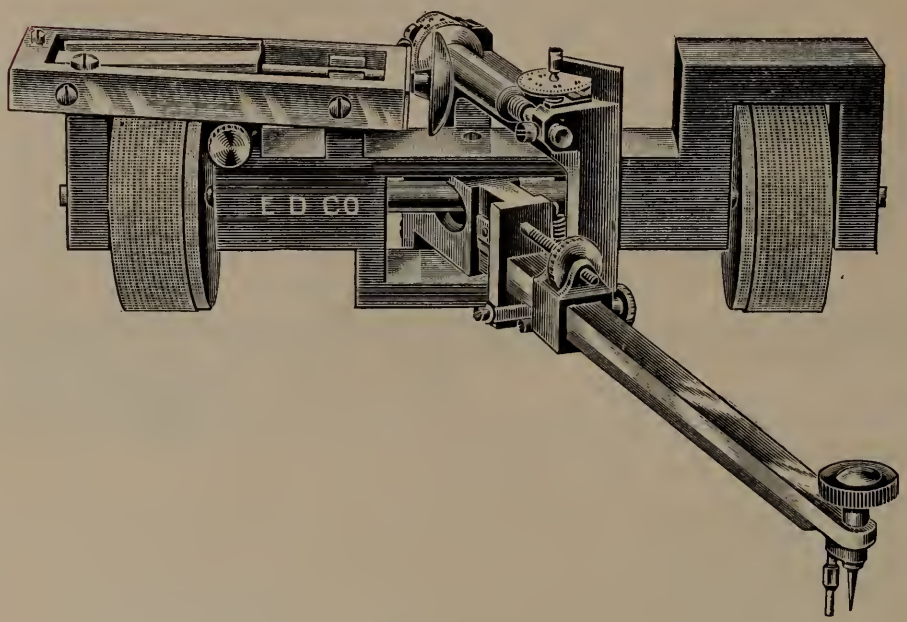
PLANIMETERS

Continued



No. 6615.

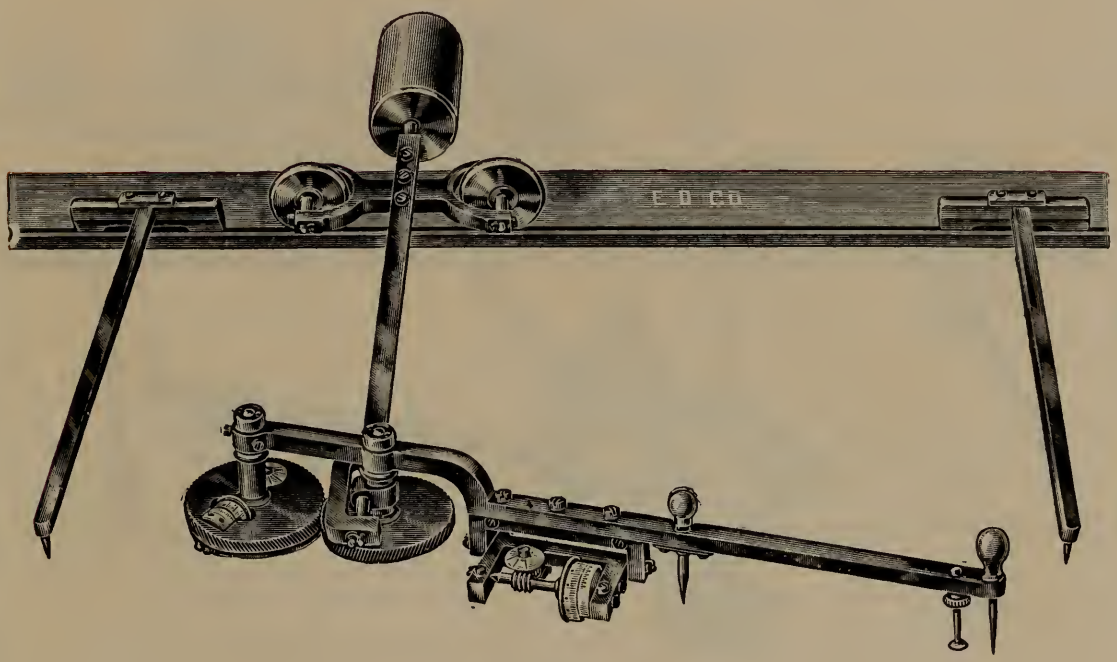
No. 6615. Suspended Ball Planimeter, German Silver and Brass, tracer arm 11¼ inches long, the pole arm 6¼ inches long, and the diameter of the toothed circle on the pole is 6¼ inches long. The angular motion of the tracer arm is about 90 degrees. Surfaces from 2½×4 in., to 7×10 in. can be measured without moving the pole. Instrument complete, in morocco case, and complete book of instructions, ... Each, $85 00



No. 6617.

No. 6617. Rolling Ball Planimeter, German Silver and Brass, having tracer arm 11¾ inches long, which can be increased by a lengthener to 19¾ inches. Its angular motion is about 90 degrees. The two rollers are made of exactly equal diameters, ensuring the motion of the instrument, as a whole, in a straight line. A surface of any length and of a width of 20 inches can be measured with the 19¾ in. tracer arm. Instrument complete, in morocco case, and complete book of instructions, . Each, $95 00

AMSLER'S MECHANICAL INTEGRATORS



No. 6625.

The Integrator may be used in Naval Architecture for measuring displacement, center of buoyancy, volume and center of holds, and for calculations of stability. In general work, this instrument is valuable whenever areas, moments, centers of gravity of diagrams, volumes of solids of rotation are to be determined. The Integrator is of simple construction, easily operated, and a complete book of Directions is furnished with each instrument.

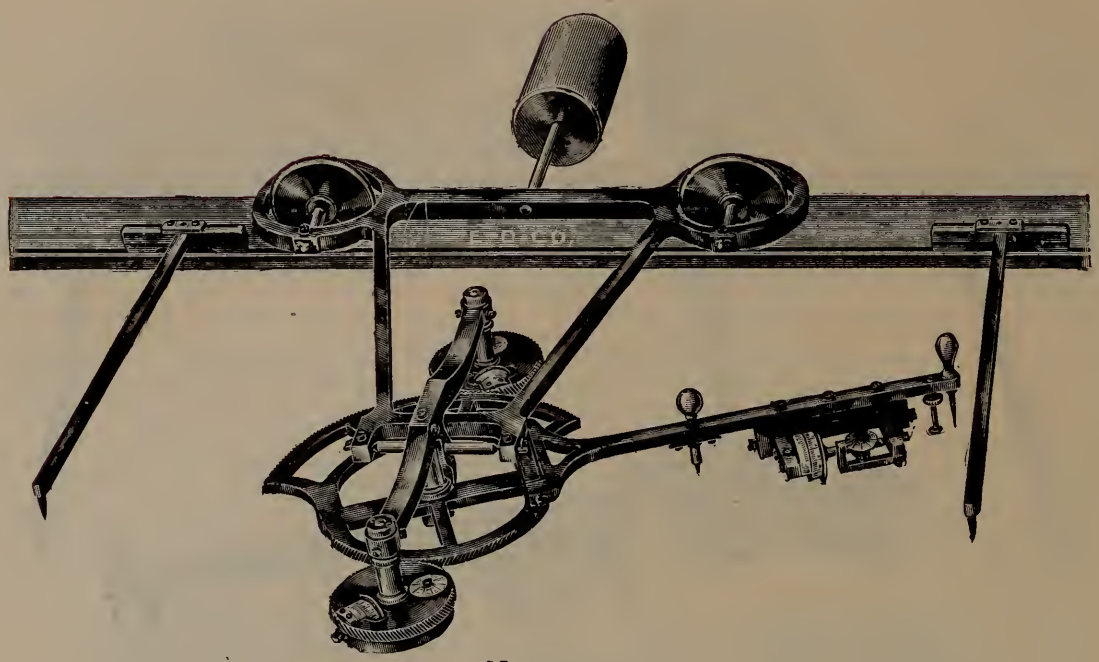
No. 6625.	Amsler's Integrator, of German Silver, with two independent recording devices, one giving the moment of figure, the other the area; with two tracing points, two gauges for fixing axis of moments, with grooved steel rail, in polished hardwood case, with directions, ...	Each,	$110 00
6627.	Amsler's Integrator, like No. 6625, but of Brass, .	"	90 00

Dimensions:

Longitudinal range	26	inches.
Transverse range	15	"
Length of Rail	29	"
Distance from Rail to axis of moments	7½	"

Grooved Steel Rails of other length furnished to order.

AMSLER'S MECHANICAL INTEGRATORS *Continued*



No. 6630.

This instrument has three recording mechanisms, giving the Area, Moment and Moment of Inertia; two tracing points and two gauges for adjusting instrument to axis of moments.

No. 6630. Amsler's Integrator, of German Silver, in polished hardwood case, grooved steel rail 59 inches long, in separate case, with complete book of instructions, . . Each, $175 00

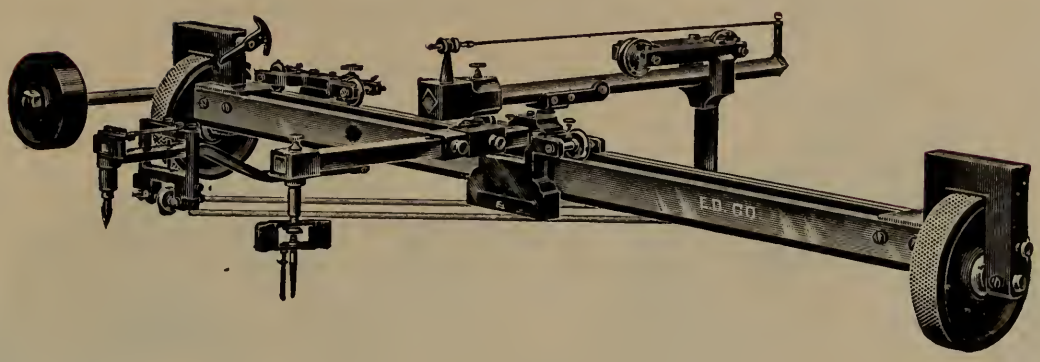
6632. Amsler's Integrator, of Brass, in hardwood case, grooved steel rail 59 inches long, in separate case, with complete book of instructions, ... Each, 150 00

Dimensions:

Longitudinal range,	50 inches
Transverse range,	13 "
Length of Rail,	59 "
Distance from Rail to axis of moments,	7½ "

Grooved Steel Rails of other length furnished to order.

MECHANICAL INTEGRAPH



No. 6642.

The Integraph has proved to be of considerable aid to Civil and Mechanical Engineers and particularly Naval Architects. To the bridge builder it is invaluable, being a great help in ascertaining with great rapidity, the moments of tensile strength, etc., of a bridge.

With this instrument the different moments, curves of stability and inertia can be readily computed the same as is done with the integrator, but the integraph has one advantage; with the integrator it is necessary to compute the several curves point by point and to construct them by means of the computed points, while the integraph directly draws the curves on the paper, thus giving a graphical representation of the integration.

The manipulation of the instrument is simple. The operator draws the principal points through the outlines of the different curves to be calculated. The pen or pencil point automatically draws the integral lines and not only can the result be read off on the graduated bar, but the whole course of integration (differential curves), is shown.

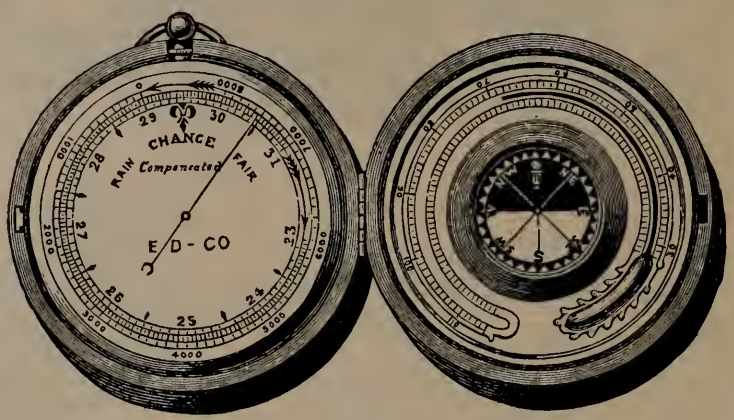
No. 6642. Mechanical Integraph, German Silver and Brass, of improved construction and great accuracy. The instrument rests on two broad rollers. Movement of the balances is 26 centimeters, the basis may be set from 2 in. to 5 in., and has a lateral movement of 10.3 in. The bar is graduated to 1-10 inches with vernier reading to 1-100 inches and micrometer screw; pen and pencil point is attached to the sliding rack of the instrument. In walnut case with testing rule and directions, ... Each, $175 00

6645. Mechanical Integraph, like No. 6642, but with possible setting from 4 in. to 8 in., and with lateral movement of 20⅓ inches, ... Each, $240 00

ANEROID BAROMETERS

For Measuring Heights and Atmospheric Pressure.

No. 6705A.



6725.

No. 6700. Watch pattern, gilt case, 1¾ in. diam., silvered metal dial, revolving altitude scale 8,000 feet, in morocco case, Each, $12 50

6705A. Watch pattern, gilt case, 1¾ in. diam., of superior quality, silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, in morocco case, . . Each, 18 00

6705B. Like No. 6705A, but altitude scale 3,000 feet, . . " 19 00
6705C. " " 6705A, " " " 5,000 " . . " 18 50
6705E. " " 6705A, " " " 12,000 " . . " 18 50
6705F. " " 6705A, " " " 16,000 " . . " 20 00
6705G. " " 6705A, " " " 20,000 " . . " 22 00

6710A. Watch pattern, gilt case, 1¾ in. diam., silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, detachable bar needle compass on reverse side, in morocco case, ... Each, 26 00

6710E. Like No. 6710A, but altitude scale 12,000 feet, . " 26 80
6710F. " " 6710A, " " " 16,000 " . " 28 50
6710G. " " 6710A, " " " 20,000 " . " 29 70
6710H. " " 6710G, but stem winding adjustment to revolving ring, ... Each, 32 00

6720A. Watch pattern, nickel spring hunting case, 1¾ in. diam., silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, in morocco case, . . Each, 19 00

6720B Like No. 6720A, but altitude scale 3,000 feet, . " 20 00
6720C. " " 6720A, " " " 5,000 " . " 19 50
6720E. " " 6720A, " " " 12,000 " . " 19 50
6720F. " " 6720A, " " " 16,000 " . " 21 00
6720G. " " 6720A, " " " 20,000 " . " 23 00

6725. Watch pattern, double opening gilt case, 1¾ in. diam. silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, with small Singer pearl compass and thermometer on ivory in lid of morocco case, . Each, 29 50

ANEROID BAROMETERS *Continued*

For Measuring Heights and Atmospheric Pressure.

No. 6730F.

6757.

No. 6730A. Pocket pattern, gilt case, 2½ in. diam., silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, in morocco case, ... Each, $20 00

6730B. Like No. 6730A, but altitude scale 3,000 feet, . . " 21 00

6730C. " " 6730A, " " " 5,000 " . . " 20 50

6730E. " " 6730A, " " " 12,000 " . . " 21 00

6730F. " " 6730A, " " " 16,000 " . . " 22 00

6735A. Pocket pattern, ***aluminum case***, 2½ in. diam., silvered metal dial, revolving altitude scale 8,000 feet, compensated for temperature, in morocco case, ... Each, 22 50

6735C. Like No. 6735A, but altitude scale 5,000 feet, with keyless action, ... Each, 24 50

6735D. Like No. 6735A, but altitude scale 10,000 feet, with keyless action, ... Each, 25 00

6750. Barometer, English Government pattern, bronzed case, 5 in. diam., best engraved silvered dial, graduations on raised ring, fixed altitude scale 5,000 feet, revolving index, compensated for temperature, curved thermometer, in morocco case, Each, 31 50

6752. Like No. 6750, but altitude scale 12,000 feet, . . " 34 00

6754. " " 6750, " " " 16,000 " . . . " 36 00

6757. Pocket pattern, gilt case, 2½ in. diam., a very portable form of surveying aneroid, no vernier or magnifier being used. The silvered metal dial is arranged to show an altitude scale of 5,000 feet in single 5 feet divisions in a repeating circle of divisions. The outside scale is divided to 10 feet and the scale directly beneath it subdivides it to 5 feet divisions, compensated for temperature, in pigskin case, Each, 45 00

ANEROID BAROMETERS *Continued*

For Measuring Heights and Atmospheric Pressure.

No. 6760.

6769.

No. 6760. Surveying Barometer, bronzed case, 3 in. diam., best engraved silvered dial, graduations on raised ring, fixed altitude scale 5,000 feet, vernier scale moved by rackwork motion, reading to 1 foot, compensated for temperature, adjustable reading lens, in leather sling case, ... Each, $50 00

6761. Like No. 6760, but altitude scale 10,000 feet, . . " 54 00

6762. " " 6760, " " " 16,000 " . . . " 58 00

6763. " " 6760, but ***aluminum case***, ... " 59 00

6765. Surveying Barometer, bronzed case, 5 in. diam., best engraved silvered dial, graduations on raised ring, fixed altitude scale 5,000 feet, vernier scale moved by rackwork motion reading to 1 foot, compensated for temperature, adjustable reading lens, in leather sling case, ... Each, 55 00

6766. Like No 6765, but altitude scale 10,000 feet, . . " 59 00

6767. " " 6765, " " " 16,000 " . . . " 63 00

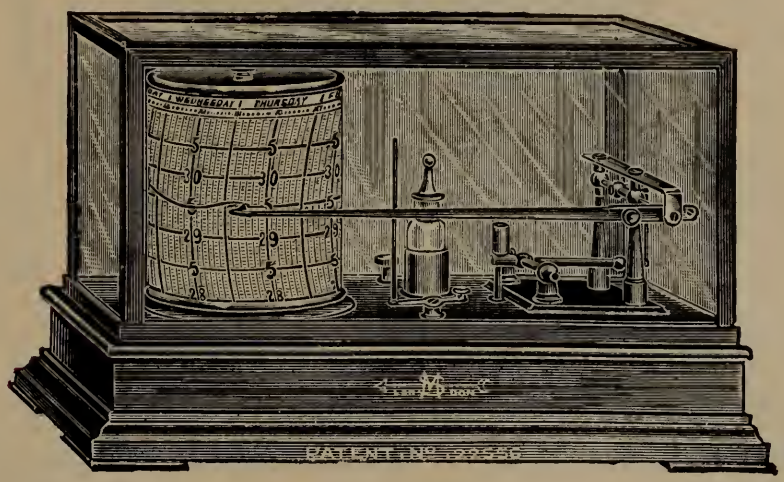
6768. " " 6765, but ***aluminum case***, ... " 64 00

6769. Mining Barometer, bronzed case, 3 in. diam., best engraved silvered dial, graduations on raised ring, fixed altitude scale 2,000 feet below and 4,000 feet above sea level, vernier scale moved by rackwork motion reading to 1 foot, compensated for temperature, adjustable reading lens, in leather sling case, ... Each, 50 00

6770. Mining Barometer, like No. 6769, but 5 in. diam., . " 55 00

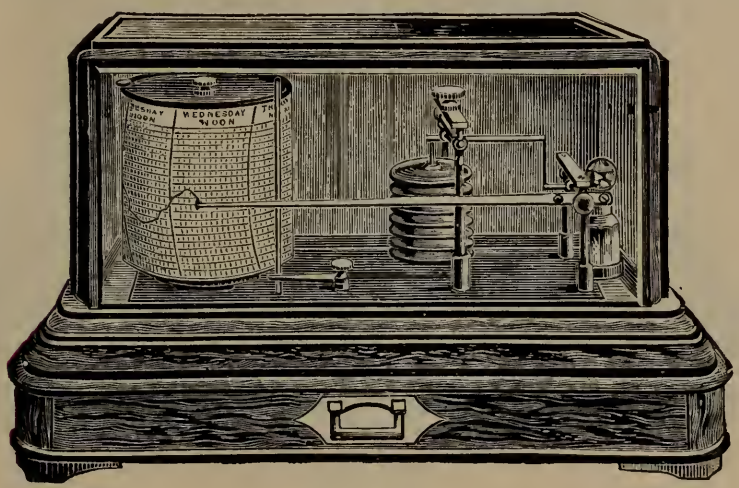
BAROGRAPHS AND THERMOGRAPHS

These instruments are constructed to record weekly the varying atmospheric and temperature conditions by means of a German silver arbor connected at one end with the Aneroid Barometer, and carrying at the other end a pen that records automatically on a revolving graduated chart.



No. 6800.

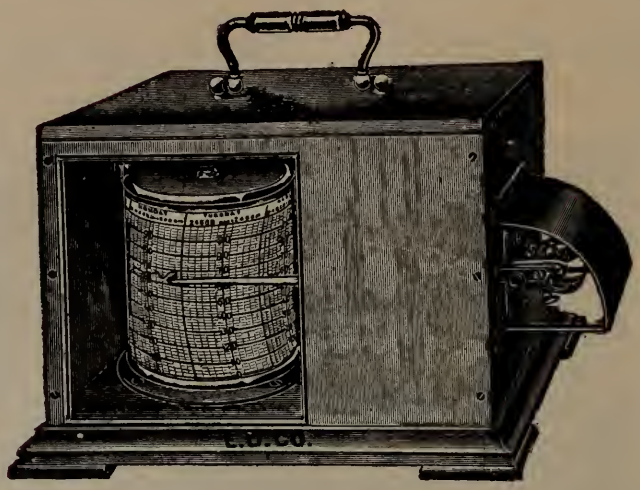
No. 6800. Barograph, simplified form, recording one week. The movement of the recording pen is worked by a large vacuum chamber concealed in the base of the instrument. The most desirable and popular priced barograph on the market. Clock and charts are identical to those of the high priced instruments. Complete with ink and a year's supply of charts, in fumed and waxed oak case, ... Each, $40 00



No. 6802.

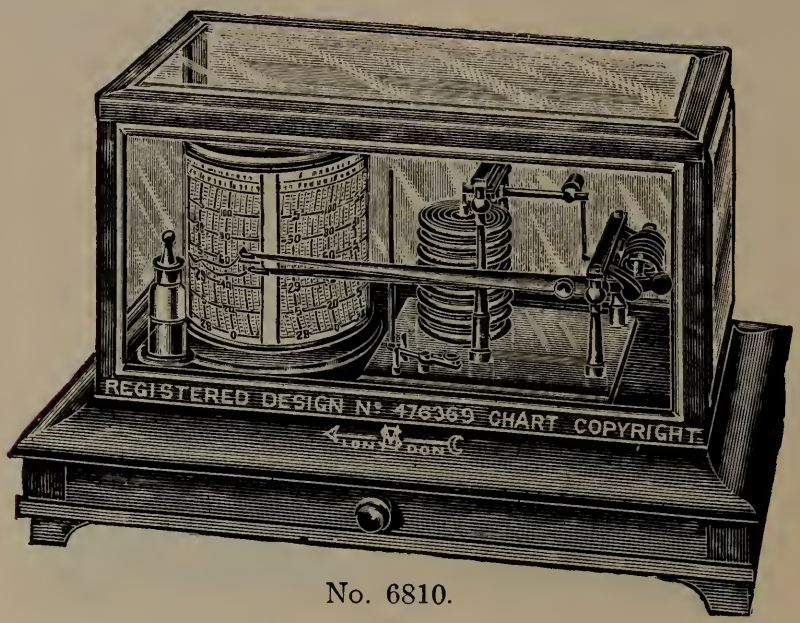
No. 6802. Barograph, recording one week by two hour intervals from 28 to 31 in. Pen arm controlled by a series of 8 vacuum chambers and recording on a revolving drum 3½ in. diameter, with Seth Thomas clock movement, which has exposed regulations to permit re-adjustment of the clock rate if necessary. In finely finished mahogany case with beveled plate glass and drawer for used and unused charts, complete with ink and a year's supply of gummed and perforated charts, Each, $57 00

BAROGRAPHS AND THERMOGRAPHS *Continued*



No. 6806.

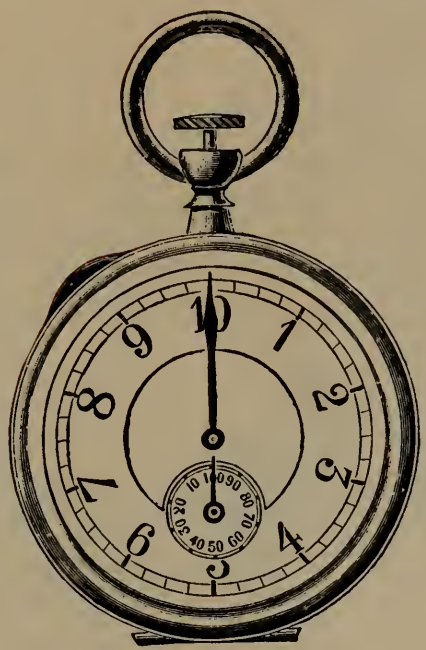
No. 6806. Thermograph, recording one week, from 0 to 100 degrees Fahrenheit, by 2 degrees. The movement consists of a spiral lamina of non-rusting material which is exposed to the atmosphere at the end of the case. It is extremely sensitive and is not affected by vibration, as the pen arm is in direct connection with the coil. In copper case, complete, with ink and a year's supply of charts, ... Each, $43 00



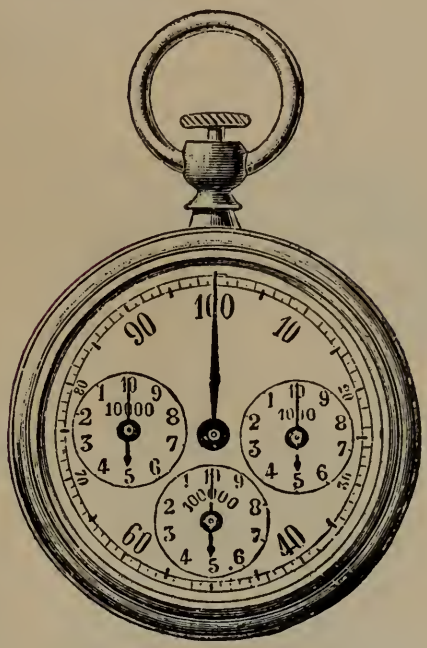
No. 6810.

No. 6810. Combined Barograph and Thermograph, with non-corrosive thermometric coil, both recording on one chart for one week. The barograph chart range is from 28 to 31 in.; thermograph chart from 0 to 120 degrees by 2 degrees. The non-corrosive steel coil is superior to the old form of bourdon springs filled with alcohol, the porosity of which permits the evaporation of the alcohol. Complete with two different colored inks (blue for the barograph and green for the thermograph), and a year's supply of charts. In finely finished mahogany case with beveled plate glass and drawer, . . . Each, $85 00

PEDOMETERS AND ODOMETERS

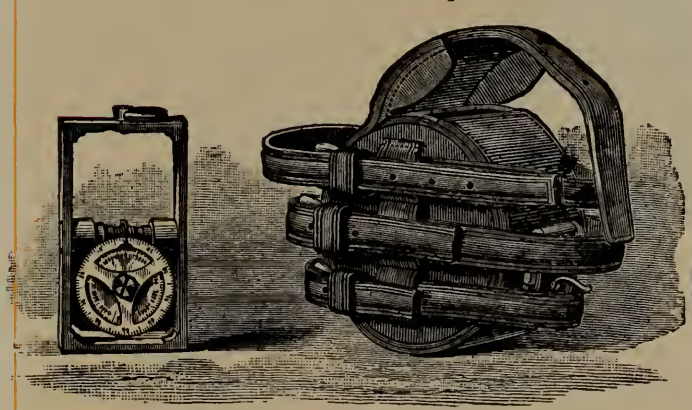


No. 6902.

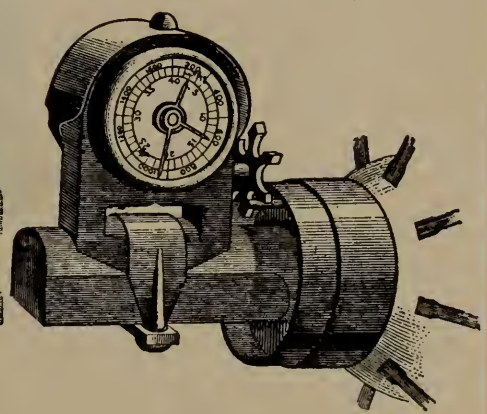


6904.

No. 6900.	Pedometer, watch pattern, nickel case, registering distance walked to 12 miles, ... Each,	$4	50
6902.	Pedometer, watch pattern, nickel case, crystal back, registering distance walked to 100 miles, ... Each,	5	25
6903.	Passometer, watch pattern, nickel case, with 3 hands, registering 25,000 steps, ... Each,	6	00
6904.	Passometer, watch pattern, nickel case, with 4 hands, registering 100,000 steps, ... Each,	6	50



No. 6906.



6907.

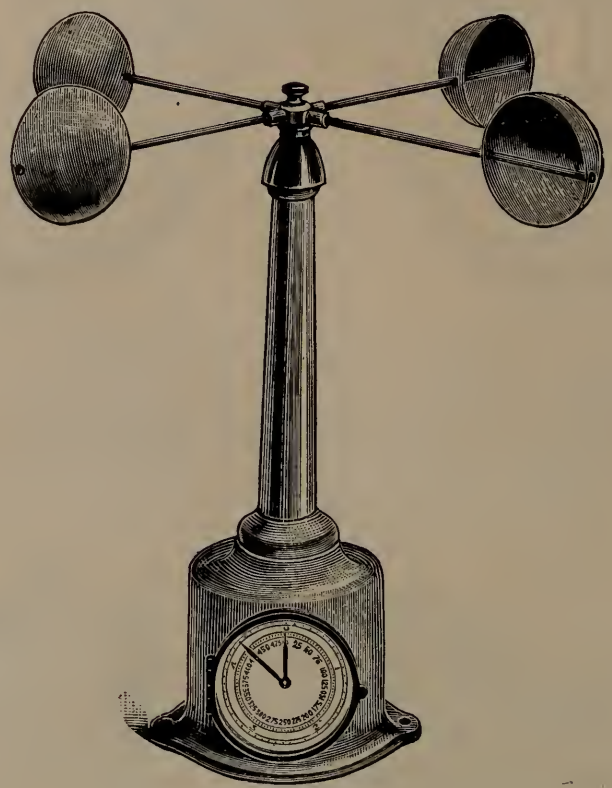
No. 6906.	Odometer, inside dial, with leather case and straps, Each,	$15	00
6907.	Improved Davis Odometer, registers distance traveled to 1,600 miles and repeats; rings a small bell as each mile is passed, ... Each,	5	00

The Davis Odometer can be used for any kind of vehicle, the illustration shows method of attaching to axle with pin in hub. They are made for wheels of any size from 28 to 54 in., varying every half inch. In ordering it is necessary to state the **exact diameter** of the rear wheel of carriage, from outside to outside of tire.

ANEMOMETERS

Or Wind Gauges.

For measuring the velocity of air currents in mines, sewers, hospitals, public and private buildings, etc. Each instrument is tested separately, and has a correction table for variations, showing the amount of air, in feet, to be added and deducted.



No. 6908.

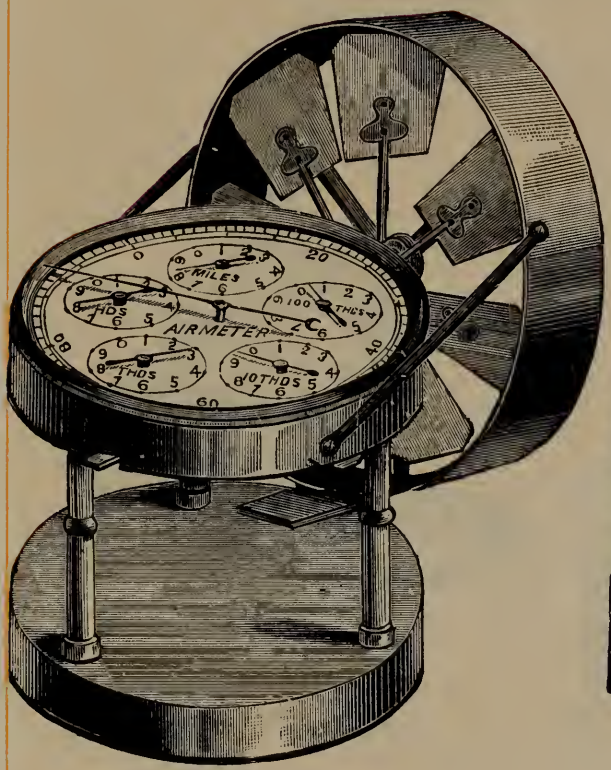
No. 6908. Robinson's Improved Anemometer, ... Each, $30 00

The four hemispherical cups are set in rotation by the motion of the air and the number of revolutions is recorded by the mechanism in the base of the instrument. The vertical axis communicating the motion of the cups to the recording mechanism runs in ball bearings, which insures a sensitive and delicate movement. The results of observations can be read off on an enameled dial on the face of the base. The outer circle of this dial registers 5 miles by $\frac{1}{10}$ mile and the inner one up to 500 miles. The two hands can be set to zero.

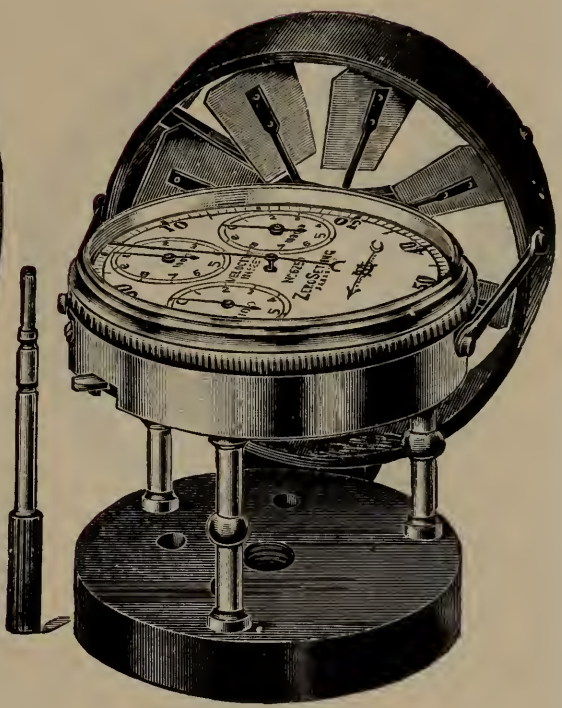
ANEMOMETERS

Continued

Or Wind Gauges.



No. 6910.



6912.

No. 6910. Portable Air Meter, diameter of fan wheel 2¾ inches, with disconnector. The indications are obtained by the revolution of a series of fans, acting first upon the large dial, divided to 100 feet, and then successively by a train of wheels on the indexes of five smaller dials, recording respectively 1,000. 10,000, 100,000, 1,000,000 and 10,000,000 feet, or 1,893 miles; in wooden case, ... Each, $24 00

6911. Same as No. 6910, but with sand glass timer, in wooden case, ... Each. 27 50

6912. Portable Air Meter, with disconnector, 4 dials recording to 100,000 feet, with key for zero setting, in wooden case, Each, 24 00

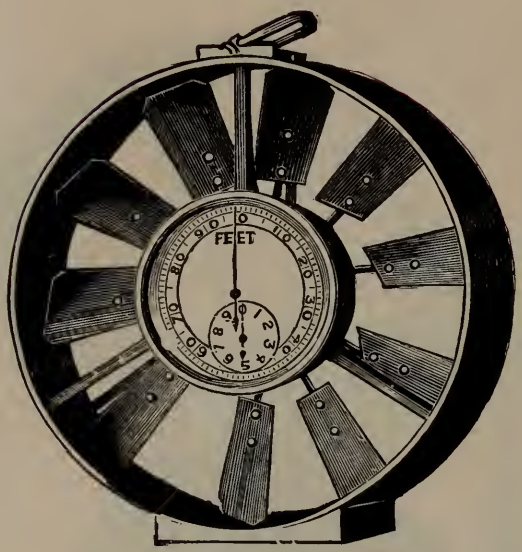
6913. Same as No. 6912, but with sand glass timer, in wooden case, ... Each, 27 50

The Timer consists of a sand glass which acts as a stop and also serves to easily compute the time the current takes in passing through the fans.

We have the best facilities for testing and repairing Anemometers.

ANEMOMETERS *Continued*

Or Wind Gauges.



No. 6922.

6935.

No. 6922. Biram's Anemometer, 2 dials, 4 in. diameter, reading to 1,000 feet, with disconnector, in wooden case, . . . Each, $22 50

6924. Biram's Anemometer, 4 dials, 4 in. diameter, reading to 100,000 feet, with disconnector, in wooden case, . Each, 23 50

6928. Biram's Anemometer, 2 dials, 6 in. diameter, reading to 1,000 feet, with disconnector, in wooden case, . . . Each, 26 00

6930. Biram's Anemometer, 4 dials, 6 in. diameter, reading to 100,000 feet, with disconnector, in wooden case, . Each, 28 50

6932. Biram's Anemometer, 6 dials, 6 in. diameter, reading to 10,000,000 feet, with disconnector, in wooden case, Each, 32 00

6935. Anemometer, watch pattern, 2 in., registering to 1,000 feet; nickel plated hunting case, with stop. When open the two covers form a base for the instrument; in morocco case, Each, 30 00

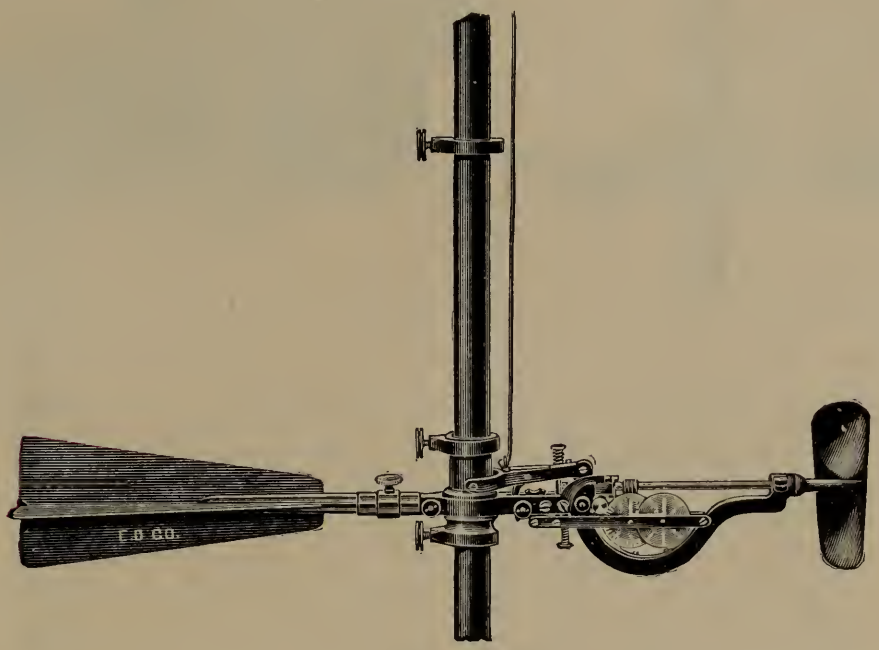
CURRENT METERS

The increased demand for high grade instruments to correctly measure the speed of flowing water, has led us to introduce the following line of Current Meters, which are superior to other makes on account of their accuracy and simplicity of construction.

As will be noted from the description on the following pages, the meters are made in two types: One with mechanical counting apparatus especially adapted for use in small streams, canals and shallow waters; the other one with mechanical counting apparatus and electric bell and telephone.

Among other improvements which our Current Meters possess are the ball bearings, insuring easy and uniform motion; the improved mechanism for engaging and disengaging the counting wheel and the discarding of all walls surrounding the counting apparatus. The latter will be found especially serviceable as the sand, mud, etc., that drives with the current cannot settle in the instrument and thus render it inaccurate. Our meters therefore insure excellent working under the most difficult conditions and greater accuracy in the observations.

The computation of the velocity of the water is very simple and full instructions are furnished with each instrument.



No. 6960.

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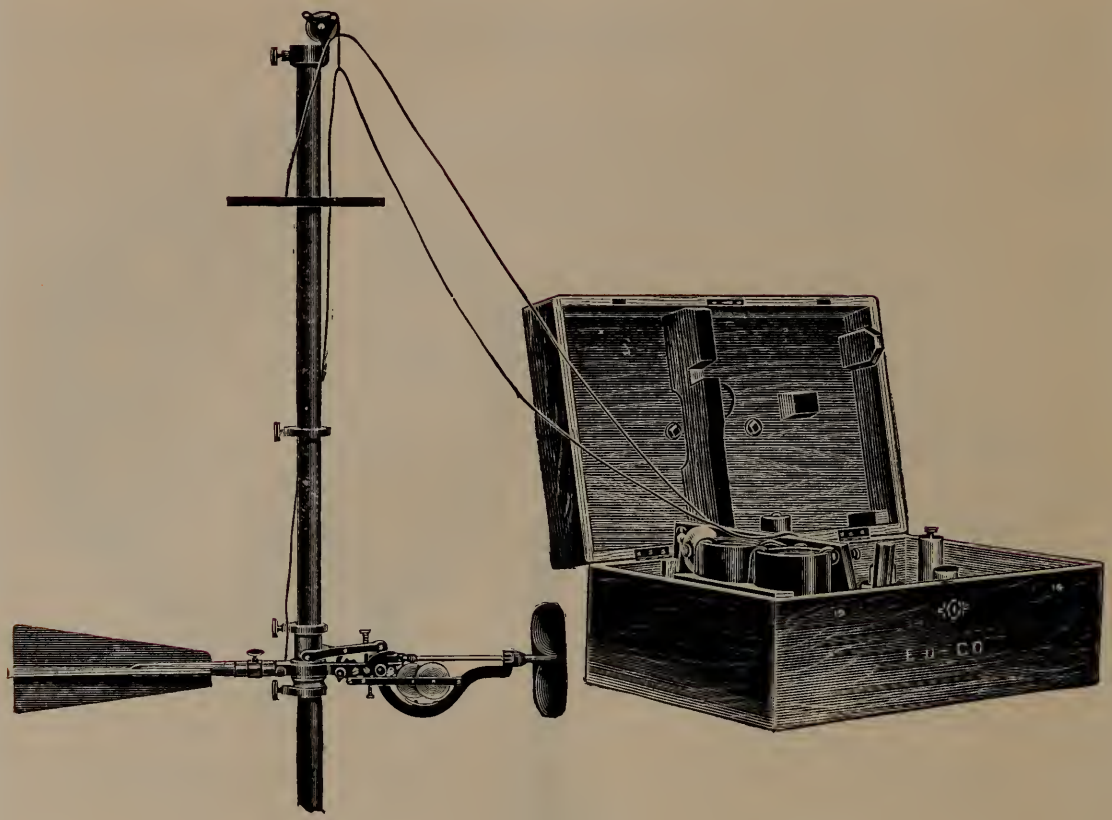
CURRENT METERS

Continued



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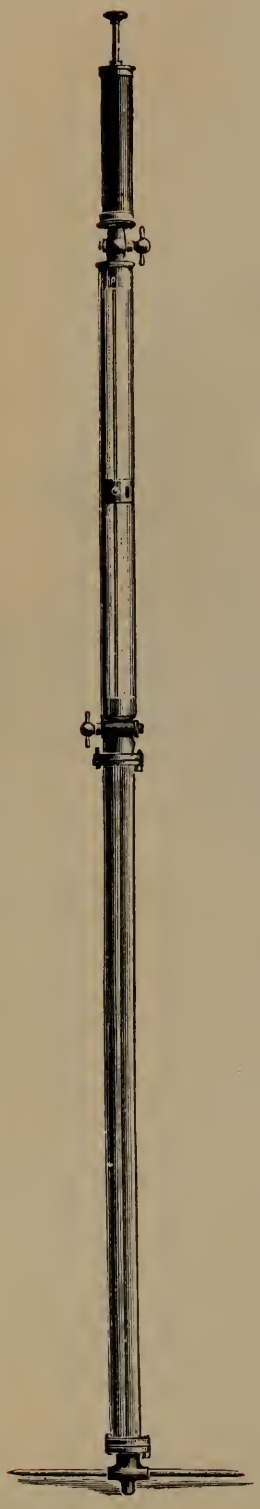
No. 6962. Current Meter, for mechanical registration in connection with electrical contact for every 100 revolutions; 2 graduated wheels registering to 1000 revolutions. The metal rudder has 4 blades 8½ in. long with a diameter of 4 in., continuous engaging and disengaging mechanism to registering wheels. The outfit is equipped with a pulley for top of pole, sights for determining the direction of instrument and has 2 best quality dry cells. The instrument fits on a ¾ in. gaspipe, or a pole of about 1 in. diameter. It can be taken apart and stored compactly in a polished hardwood case, complete (without pole or pipe), ... Each, $135 00

No. 6964. Current Meter, for mechanical as well as electrical registration. This instrument may be used in shallow water as well as in deep streams, and is so constructed that it not only records every revolution and every 100th revolution, but also undertows or counter currents, making it especially valuable for all waters with an under current. Length of 4-bladed metal rudder 8½ in., diameter 4 in. The instrument fits on a ¾ in. gaspipe or a pole of about 1 in. diameter. Complete with electric battery, telephone, pulley for top of pole, sights for determining the direction of instrument, insulated copper wire, screw driver, etc., in polished mahogany box, (without pole or pipe), ... Each, $155 00

HYDROMETRIC TUBE

(Pitot's Tube.)



This is another type of instrument for measuring the velocity of currents, and consists, principally, of two parallel tubes connected at the top, the lower ends being bent at right angles so that the openings are in opposite directions.

To measure the velocity of currents, the instrument is immersed into the stream directing one opening against the stream, thus causing the water to rise higher in the up stream tube than in the downward directed one. The difference in height of the two water columns is the velocity, which is proportional to the square of the speed in meters per second.

As it will be necessary for the convenient observation of the height of the water in the tubes, to bring the water above the surface of the stream, a small pump has been attached to the top of the tubes with which the air pressure above the water columns can be reduced; this permits the water to rise in the tubes proportionally without affecting the difference of height in the least. The instrument is further provided with a faucet below the glass tubes with which the flow of water can be shut off as soon as the water columns have assumed a steady position. It may then be withdrawn from the stream to a convenient position, and with the aid of the sliding sight the readings of both tubes can be taken with the mm. scale provided for that purpose.

The Hydrometric Tube is particularly well adapted for use in shallow waters where the Current Meter, on account of its size and construction, cannot be used advantageously.

With each instrument is furnished a correct formula for determining the velocity, where:

V=velocity in meters per second.
h2=height of water column in mm.
h1= " " " " " "

Thus $V=0.14\sqrt{h2-h1}$

No. 6968. Hydrometric Tube, in polished hardwood case, weight complete about 20 pounds, ... Each, $110 00

RAIN GAUGE

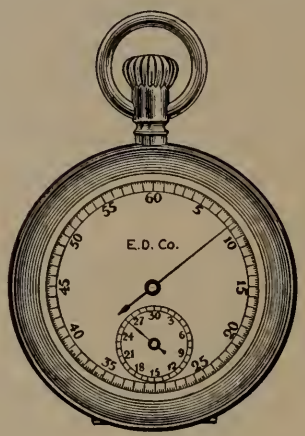
No. 6976.

The Rain Gauge illustrated above is known as the "tilting bucket" rain gauge. No measurement is necessary, as the rain is collected in the 8 in. receiver and is taken through a small pipe and dropped into one side of a bucket. When a given amount of rain has collected in the bucket (0.01") the weight of the rain on the laden side causes it to overbalance and, by a mechanical arrangement, the hand moves 0.01" at each operation. The rain, still passing through the receiver, is collected in the opposite bucket; when that has received the given amount, the same operation is repeated. Its great advantage is that it is zero setting, making it particularly useful to anyone desiring to keep a record of rain-fall by the month or week, as by the zero setting device no calculation is necessary. The dial registers 1 inch in 1-100th inch; the second or smaller dial reads to 12 inches.

No. 6976. Zero-setting Rain Gauge in Japanned Metal Case, 8×10 in., Each, $27 00
6978. " " " Copper Case, 8×10 " " 32 00

An advantage which applies to this gauge is that the collecting funnel can be placed at a distance from the gauge, and connected to it by a small pipe, the instrument being placed within a house or shelter.

STOP WATCH



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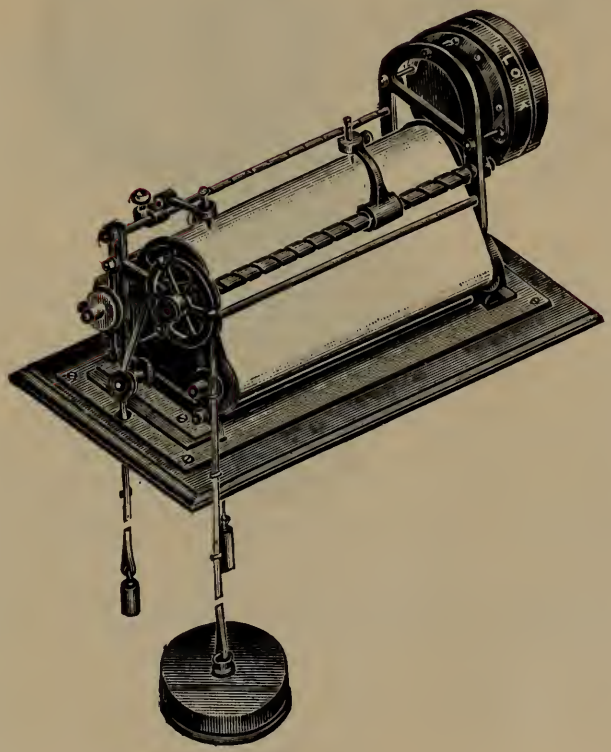

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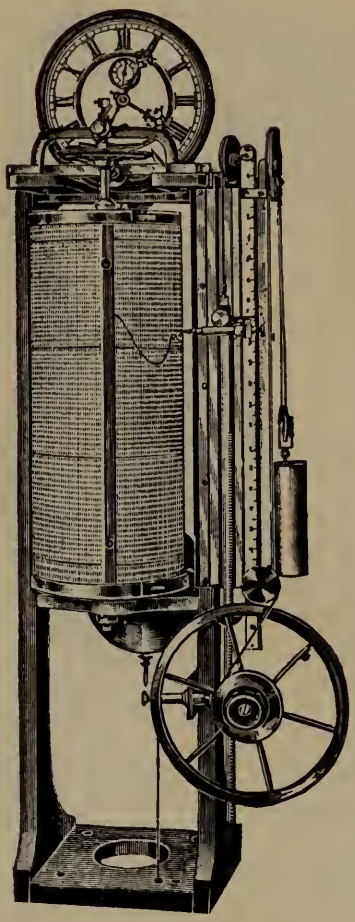

No. 6997.

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This instrument is applicable for analogous observations in branches of Hydraulic Engineering, as in Fresh Water Rivers, Canals, Aqueducts, Reservoirs, Sewers, Deep Wells, etc., and wherever it is required to obtain an accurate record of periodical changes in the level of any liquid.

By a pencil a curve is traced on paper, the abscissae of which represent time while the ordinates represent the rise and fall of level.

The gauge occupies but little space and can be removed, transported and reset without much difficulty. It is compact, strong and reliable, and with ordinary attention will not get out of order. The exposed parts are of brass and phosphor bronze, and will therefore not be affected by a moist atmosphere.

For recording, either single sheets or a continuous strip of paper may be used. The recording cylinder, moved by a clock, is adapted for paper 13 in. wide and makes one revolution in 12 hours, recording time to a scale of one inch per hour and the change of level to a scale of one inch per foot, providing for a variation of 12 feet in level.

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The balanced float is attached to a rack and pinion which imparts the motion to the pencil as the tide rises and falls. The cylinder, making one revolution in seven days, carries the graduated chart upon which the curve is automatically drawn.

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7152.

No. 7150.	Mounted in rubber,	1	lens,	1	in.	diameter,	.	.	.	Each,	$0 35
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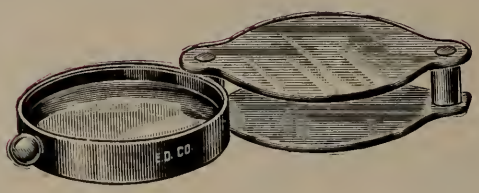
7152.	"	"	2	"	1	"	"	.	.	.	"	60
7153.	"	"	2	"	1½	"	"	.	.	.	"	1 00



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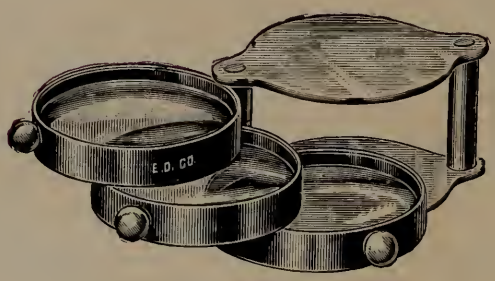

7172.

No. 7170.	Mounted in metal, nickel plated,	1	lens,	1	in.	diam.,	Each,	$0 75
7171.	"	"	"	2	"	1	"	"	"	1 00
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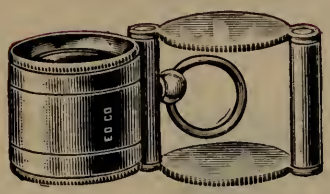

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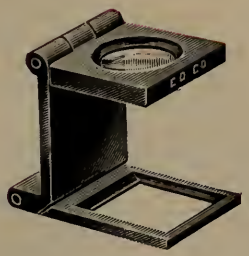

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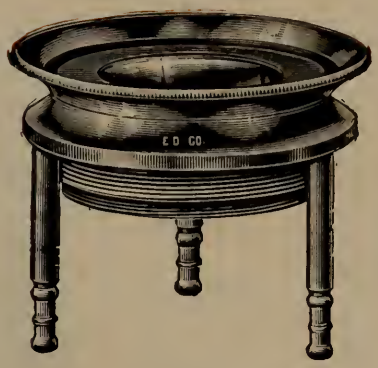

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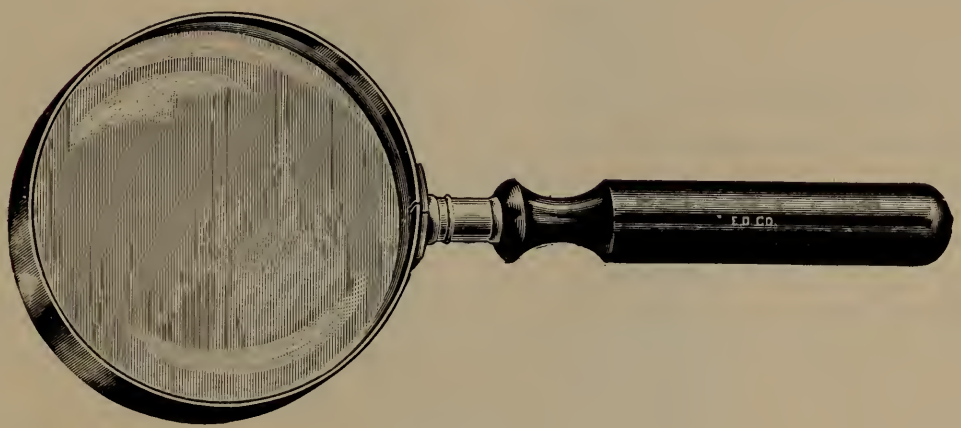

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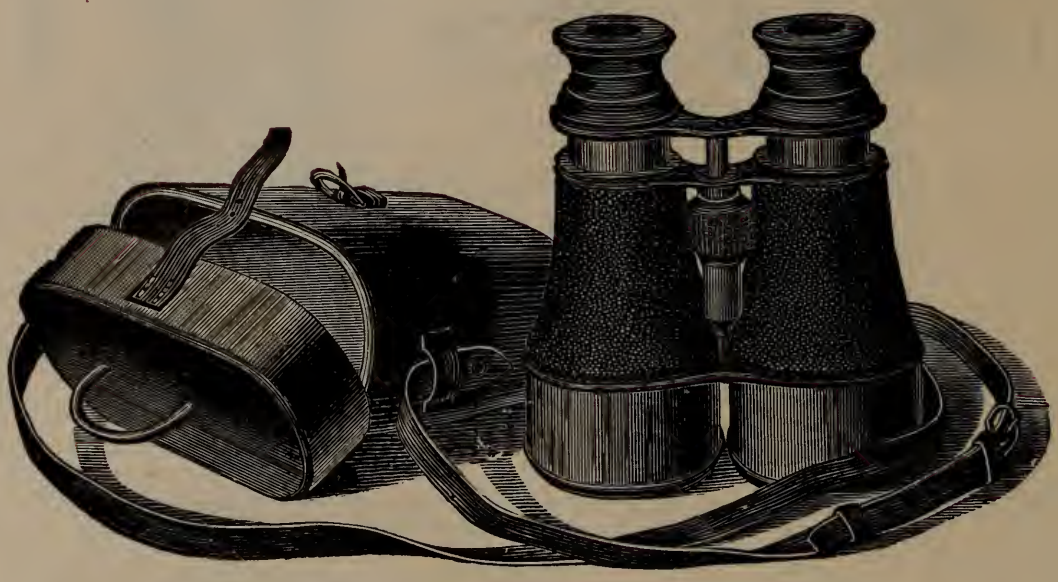

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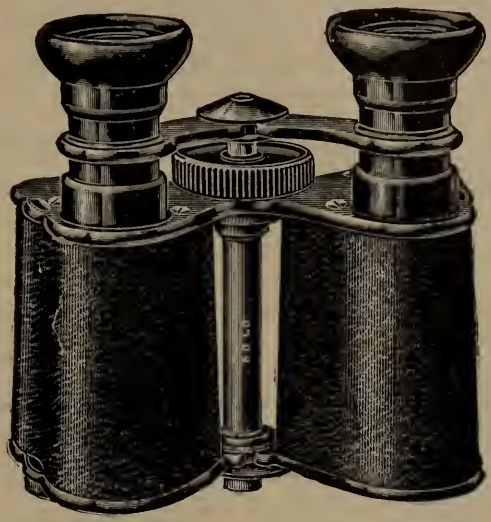

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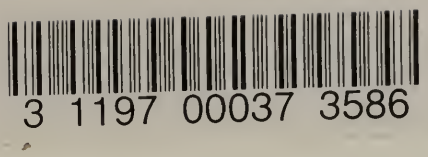
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